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THERMODYNAMIC PROPERTIES OF AIR AT HIGH TEMPERATURES

by

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ABSTRACT

Our knowledge of the thermodynamical properties of air is surprisingly incomplete. In the lower temperature range, i.e.,below 25,000°K, Brinkley, Kirkwood, and Richardson (BKR) (OSRD-3550) and Bethe (OSRD-369) have not computed enough primary points to permit accurate determinations of the variation of the thermodynamical properties along adiabats. The secondary tables which BKR have computed are extremely rough and cannot be used satisfactorily for following the shock hydrodynamics by the method of characteristics. Similarly in the high temperature range, Fuchs, Kynch, and Peierls (FKP) (MS-61 ; BM-83) have not computed enough primary points and they do not consider extremely low densities. We have tried to fill in additional points by making crude assumptions which make the calculations quick but inaccurate. We then attempted to fit these computations smoothly onto the published results. The following tables are therefore unsatisfactory, but they are qualitatively correct and should serve to obtain the qualitative and semi-quantitative features of the hydrodynamics of shocks in air. It seems to us highly desirable that accurate tables of the thermodynamical properties of air be computed. This project would be easy to set up but the actual computations are sufficiently difficult that it would require approximately ten people for one year.

Our thermodynamical tables are set up in two sections. The first gives essentially the primary points with only a slight amount of smoothing. Because the value of gamma jumps with temperature and pressure in a very erratic fashion, these first tables are not suitable for hydrodynamical shock calculations with either the method of characteristics or the I.B.M machine. In the second section, the equation of state has been put into a form suitable for I.B.M. and characteristic calculations. This has involved a considerable amount of smoothing and some loss of accuracy.

THERMODYNAMIC PROPERTIES OF AIR AT HIGH TEMPERATURES

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In part A, we present a series of tables designed to form an extension to the tables of Brinkley, Kirkwood, and Richardson (BKR) which purported to be suitable for integration of the hydrodynamics of normal explosions. Our calculated extensions to these tables are made to fit the published values of BKR, Bethe, and FKP. Unfortunately the variation of the value of gamma, inaccuracies in the tables, and a lack of primary points make these tables rough - too rough to use with either the I.B.M. integrations or the method of characteristics. Therefore in part B we have smoothed the equation-of-state data so that it is suitable for these uses but perhaps we have lost some accuracy in so doing.

Part A. Primary Calculations with Minimum Amount of Smoothing.

The thermodynamic tables are designed as an extension to the work of Brinkley, Kirkwood, and Richardson (OSRD 3550) which was supposed to be suitable for use with shock pressures up to 1000 bars. Fuchs, Kynch, and Peierls (MS-61 ; BM-83) have obtained the equation of state of air at very high temperatures and prepared tables going from 20,000° to 2,500,000° K for densities ranging between .367 and 7.33 times the normal density of air and it was only necessary for us to extend their work to lower densities, i.e., down to .0001 times the normal density of air. We made our calculations in this region on the basis of rough estimates of the equilibrium constants and thermodynamic properties. Then we adjusted our values to fit smoothly onto those of Fuchs, Kynch, and Peierls in the extremely-high-temperature range, i.e. over 25,000° K ; onto the values of H. Bethe (OSRD 369) in the temperature range between 25,000° and 15,000° K ; and onto the values of Brinkley, Kirkwood, and Richardson (OSRD-3550) in the lower temperature region. The treatment of the low-density, high-temperature region was first undertaken by Christy with the help of Flander's Group.

The thermodynamical properties of air are summarized in a series of tables:

Table I gives a complete summary of the properties of air including the molecular, atomic,and ionic compositions for the primary points which we calculated.

Table II gives the function $p/(\rho/\rho_o)$ for densities between 20 and .0001 times the normal density of air in the temperature range between 1,000,000° K and 1,000° K. This table is useful for determining the temperature when we know the pressure and density.

Table III shows the properties of air along the Hugoniot curve.

Table IV shows the properties of air at a pressure of one bar as a function of temperature.

Table V gives the properties of air for convenient values of the entropy.

Table VI gives the properties of air for regular values of the temperature.

Table VII gives the specific heat ratio as a function of entropy and density.

Table VIII gives $d\left[\log_e(p_S/p_O)\right] / d(\Delta S/R)$ versus $\Delta s/R$.

The initial state of air is taken to be one bar pressure at a temperature of 300° K. The

composition is taken to be 79 percent N_2 and 21 percent O_2. All properties are in terms of one mole of air. In general our notation is consistent with that of Brinkley, Kirkwood, and Richardson.

Our tables are particularly erratic in the neighborhood of $\Delta S/k = 20$ where the BKR and FKP tables overlap. Undoubtedly the difficulty is due to the difference in the methods of computation and the choice of fundamental constants which were used by the two research groups. Unfortunately we have not had time to resolve this discrepancy. We use the following notation:

p = pressure in bars

ρ/ρ_0 = the density of air in units of the normal density of air, 1.29×10^{-3} grams per cm^3.

$\Delta S/R$ = the increase in the entropy of the air over that of normal air expressed in units of the gas constant, R. Thus $\Delta S/R = 0$ for normal air.

η = H/RT is the enthalpy per mole divided by the gas constant times the absolute temperature. To agree with the usage of Brinkley, Kirkwood, and Richardson, we take $\eta = 3.486$ for normal air corresponding to H/R = 1046.

E/R = the internal energy per mole in units of the gas constant. In order to be consistent with the definition of enthalpy above, it is necessary for E/RT = H/RT - pV/RT where V is the specific volume. For normal air, pV/RT = 1 so that for normal air E/R = 746.

α = pV/RT - 1 = the average number of particles into which each molecule of air splits minus one. Thus $\alpha = 0$ for normal air.

γ = $1 + (\alpha+1)/(E/RT)$ = an average value of the specific heat ratio.

Z = the average number of free electrons per atom of air.

x_i = mole fraction of total oxygen atoms which are present in the i-fold ionized form.

y_i = mole fraction of total nitrogen atoms which are present in the i-fold ionized form.

x_{O_2} = mole fraction of total oxygen atoms which are present in the form of undissociated O_2.

y_{N_2} = mole fraction of total nitrogen atoms which are present in the form of undissociated N_2.

The definition of the x's and the y's is such that:

$$\sum_{i=0}^{i=8} x_i + 2\,x_{O_2} = .21 \qquad \text{and} \qquad \sum_{i=0}^{i=7} y_i + 2\,y_{N_2} = .79$$

In comparing our results with those of Fuchs, Kynch, and Peierls (FKP) it should be borne in mind that in the FKP paper, the unit of energy, of entropy, and of volume is the gram atom, i.e., one-half a mole. Also to adjust the FKP zero of entropy to ours, $S/R = 2(S/R)_{FKP} + 9.71$. No additive constants are necessary for either energy or enthalpy. Also,

please note that FKP take 285° K as the normal temperature of air instead of our 300° K.

In comparing our results with Brinkley, Kirkwood, and Richardson (BKR) it should be remembered that BKR's n's should be approximately equal to twice our corresponding x's and y's. Also their n(el) is twice our Z.

In comparing our results with those of Bethe (B) it should be remembered that Bethe's ϵ corresponds to our η ; Bethe's γ corresponds to $\alpha + 1$; and

$$(.79/2)\left[N_2\right]_B = y_{N_2} \qquad (.21/2)\left[O_2\right]_B = x_{O_2}$$

$$.79\left[N^{i\text{-fold+}}\right]_B = y_N \qquad .21\left[O^{i\text{-fold+}}\right]_B = x_i$$

$$(1/2)\left[el\right]_B = Z$$

The derivation of the values used in our tables proceeds as follows:

1) Composition

To get the composition of the air it is necessary to define a set of equilibrium constants, K_i for the oxygen and J_i for the nitrogen such that:

$$x_o^2/x_{O_2} = K_o(\rho_o/\rho) \qquad y_o^2 / y_{N_2} = J_o(\rho_o/\rho)$$

$$x_i Z/x_{i-1} = K_i(\rho_o/\rho) \qquad y_i Z/y_{i-1} = J_i(\rho_o/\rho)$$

K_o and J_o are most easily obtained from Bethe's tabulated partition functions, P(O), $P(O_2)$, P(N), and $P(N_2)$:

$$K_o = (1/2)\ 7.68\ (8)^{3/2}\ T^{3/2}\ e^{-59{,}390/T} \qquad \left[\frac{P(O)^2}{P(O_2)}\right]$$

$$J_o = (1/2)\ 7.68\ (7)^{3/2}\ T^{3/2}\ e^{-85{,}560/T} \qquad \left[\frac{P(N)^2}{P(N_2)}\right]$$

The other equilibrium constants we calculate in a much cruder fashion:

$$K_i = 4.69 \times 10^{-5} \left[g_i/g_{i-1}\right]_o \quad T^{3/2}\ e^{-(I_{i-1}/kT)_o}$$

$$J_i = 4.69 \times 10^{-5} \left[g_i/g_{i-1}\right]_N \quad T^{3/2}\ e^{-(I_{i-1}/kT)_N}$$

Here the g_i are the multiplicity of the ground state of the i-th ionized species and I_i is its ionization potential. The values which we used for g_i and I_i are:

	OXYGEN		NITROGEN	
i	I_i/k	g_i	I_i/k	g_i
0	157,800	9	168,700	4
1	407,000	4	343,000	9
2	636,000	9	550,000	6
3	898,000	6	910,000	1
4	1,321,000	1	1,139,000	2
5	1,607,000	2	5,700,000	1
6	7,750,000	1	7,750,000	2
7	10,103,000	2		1
8		1		

Having obtained the equilibrium constants, it is convenient to use the following procedure:

First, define the quantity W such that:

$W = (\rho_0/\rho)/Z$

Then we have the equations:

$$.21 = 2x_{O_2} + x_O + x_1 + \ldots + x_8$$

$$.79 = 2y_{N_2} + y_o + y_1 + \ldots + y_7$$

$$Z = x_1 + 2x_2 + \ldots + 8x_8 + y_1 + 2y_2 + \ldots + 7y_7$$

$$x_1 = K_1 W x_o \qquad y_1 = J_1 W y_o$$

$$x_2 = K_2K_1W^2x_o \qquad y_2 = J_2J_1 W^2y_o$$

$$x_8 = K_8K_7 \ldots K_2K_1W^8x_o \qquad y_7 = J_7J_6 \ldots J_2J_1W^7y_o$$

$$x_{O_2} = 1/K_o(\rho_o/\rho)\, x_o^2 \qquad y_{N_2} = 1/J_o(\rho_o/\rho)\, y_o^2$$

Defining the four quantities:

$$F = 1 + K_1W + K_2K_1W^2 + K_3K_2K_1W^3 + \ldots + K_8K_7 \ldots K_2K_1W^8$$

$$G = 1 + J_1W + J_2J_1W^2 + J_3J_2J_1W^3 + \ldots + J_7J_6\ldots J_2J_1W^7$$

$$L = K_1W + 2K_2K_1W^2 + 3K_3K_2K_1W^3 + \ldots + 8K_8K_7\ldots K_2K_1W^8$$

$$M = J_1W + 2J_2J_1W^2 + 3J_3J_2J_1W^3 + \ldots + 7J_7J_6\ldots J_2J_1W^7$$

The above equations become:

$$.21 = \frac{2}{K_o(\rho_o/\rho)}\, x_o^2 + F\, x_o$$

$$.79 = \frac{2}{J_o(\rho_o/\rho)}\, y_o^2 + G\, y_o$$

$$Z = \frac{\rho_o/\rho}{W} = x_o L + y_o M$$

These equations can be solved simultaneously for x_o, y_o, and ρ_o/ρ for any given value of W. This resolves itself into the solution of a quadratic equation for the variable $X = x_o/(\rho_o/\rho)$:

$$X^2\left[2/K_o - (.21/.79)\frac{L^2}{M^2}\,\frac{2}{J_o}\right] + X\left[F + (.21/.79)\,(L/M)\,(G + 4/J_oMW)\right]$$

$$-\left[(.21/.79)\,\frac{2}{J_oM^2W^2} + (.21/.79)\,G/MW\right] = 0$$

Then the determination of ρ_o/ρ and of Z follows easily. However, in the special case where there is no undissociated oxygen or nitrogen molecules present (above 15,000° K) there is no need to solve any quadratic equation and:

$$\rho_o/\rho = \frac{W(.21\,GL + .79\,MF)}{FG} = ZW$$

$$x_o = .21/F \qquad y_o = .79/G$$

The principal error which is made in this determination of the composition comes from not taking into account the effect of the excited atomic and ionic states on the equilibrium constants. Another error comes from not properly defining the free electrons, but this error is negligible at the low densities where we make our calculations.

2). Equation of State

At the low densities where we are primarily concerned, it suffices to use a perfect-gas equation with the proper number of separate particles. By definition α is equal to the total number of particles into which one air molecule splits minus one.

Thus: $\alpha = 2Z + 1 - 2x_{O_2} - 2y_{N_2}$

and

$$p/p_o = T/150 \frac{Z+1 - x_{O_2} - y_{2}}{\rho_o/\rho}$$

3). Internal Energy

If we neglect the contribution of the excited states, the internal energy per mole of air may be written:

$$\frac{E}{RT} = \left\{\frac{2000}{T}\right\} E_e + \frac{80,060}{T} + 3(Z+1) + x_{O_2} + y_{N_2} - \left(\frac{118,500}{T}\right)x_{O_2} - \left(\frac{171,200}{T}\right) y_{N_2}$$

where

$$E_e = 158x_1 + 565x_2 + 1,201x_3 + 2,099x_4 + 3,420x_5$$
$$+ 5,027x_6 + 12,777x_7 + 22,880x_8$$
$$+ 169y_1 + 512y_2 + 1,062y_3 + 1,972y_4 + 3,111y_5$$
$$+ 8,811y_6 + 16,561y_7$$

4). Enthalpy

The enthalpy per mole is related to the internal energy per mole by the following equation:

$$H/RT = E/RT + \alpha + 1$$

5). Entropy

The easiest way of computing the entropy from the composition is to use the formulae and numerical constants given by Mayer and Mayer[1]. We wish to obtain S/R, the entropy relative to air at one bar and 300°K. Brinkley, Kirkwood, and Richardson give the entropy in this form, but only for temperatures up to 15,000°K. The entropies of Fuchs, Kynch, and Peierls can be extrapolated down to 15,000°K (from 20,000°K) and they would agree with the BKR values if we take

$$S/R = 2(S/R)_{FKP} + 9.71$$

Since the entropy is quite sensitive to the composition, at each temperature we adjust a constant, C, so that our entropy agrees with either FKP or BKR for one value of the density. In this way we have reduced the errors due to our neglect of excited states. Thus up to the adjustable constant, C, we take for the entropy:

[1] Statistical Mechanics (John Wiley, 1940, p.440 to 444).

$$\Delta S/R = C + 4.6052$$

$$- x_o \log_{10}(x_o/9) - x_1 \log_{10}(x_1/4)$$

$$- x_2 \log_{10}(x_2/9) - x_3 \log_{10}(x_3/6) - x_4 \log_{10} x_4$$

$$- x_5 \log_{10}(x_5/2) - x_6 \log_{10} x_6 - x_7 \log_{10}(x_7/2) - x_8 \log_{10} x_8$$

$$- y_o \log_{10}(y_o/4) - y_1 \log_{10}(y_1/9) - y_2 \log_{10}(y_2/6)$$

$$- y_3 \log_{10} y_3 - y_4 \log_{10}(y_4/2) - y_5 \log_{10} y_5$$

$$- y_6 \log_{10}(y_6/2) - y_7 \log_{10} y_7 - Z\,[\log_{10} Z + 4.59015]$$

$$+ (7+1 - x_{o_2} - y_{N_2}) \left[\begin{array}{l} \log_{10}(Z+1 - x_{o_2} - y_{N_2}) + \frac{3}{2} \log_{10} T \\ + \log_{10}(\rho_o/\rho) + 1.6342 \end{array} \right]$$

$$+ x_{o_2} \left[-\log_{10} x_{o_2} + 2 \log_{10} T - 3.9715 \right]$$

$$- y_{N_2} \left[-\log_{10} y_{N_2} + 2 \log_{10} T - 4.6777 \right]$$

6). Specific Heat Ratio

The true ratio of specific heats is extremely difficult to calculate and not particularly pertinent to the hydrodynamical equations. Instead of using this quantity we consider an energy average specific heat ratio defined in terms of the internal energy:

$$E = pV/(\gamma - 1) \quad \text{or} \quad \gamma - 1 = (\alpha + 1)/(E/RT)$$

$$\left[\text{In the notation of BKR, } \gamma - 1 = 1/(B-1)\right]$$

Part B, Smoothed Equation of State of Air for Use in Integrating the Hydrodynamical Shock Equations.

In order to integrate the hydrodynamical shock equations it is necessary to smooth the equation of state data. Also, if the calculations are to be made on an I.B.M. machine, it is necessary to express the equation of state in a simple form. For this purpose we require that:

$$p/p_o = g(\rho/\rho_o)^{1.5} + h(\rho/\rho_o)$$

or the equivalent form:

$$p/p_o = b(x^{1.5} + x)$$

where

$$x = a(\rho/\rho_0)$$

In these equations the quantities a, b, g, and h are functions only of the shock pressure or the entropy. Some accuracy is lost in forcing the equation of state into this mathematical straight jacket, but this loss is not much larger than the inherent inaccuracies of the primary tables themselves. We used different procedures for obtaining the constants for shock pressures lower than and higher than 80 atmospheres.

For shock pressures above 80 atmospheres, the equation-of-state data are very rough with at least part of this roughness due to erratic changes in gamma. Because of the variation of gamma, the mathematical form which we assume is only a good approximation over a small region. We therefore chose the constants so as to fit the primary tables for $p/p_0 = 1$ and for p/p_0 as a function of entropy varying between 39 for $\Delta S/k = 40$ to 77 for $\Delta S/k = 5.4$.

The values of the constants determined in this way were still rough and had to be smoothed considerably. They were particularly rough in the neighborhood of $\Delta S/k = 20$ or $p_s/p_0 = 1000$ where the BKR and the FKP calculations overlap.

For shock pressures below 80 atmospheres, we used the following scheme for determining the constants. According to the Hugoniot relationship between shock pressure and shock density:

$$\gamma = \left(\frac{p_s/p_0 - 1}{p_s/p_0 + 1}\right) \qquad \left(\frac{\rho_s/\rho_0 + 1}{\rho_s/\rho_0 - 1}\right)$$

From the BKR tables we computed the value of gamma for different values of the shock pressure. This procedure was satisfactory except for small values of the shock pressure where the above equation becomes essentially indeterminant. For these small values of shock pressure gamma is very close to 1.4 and it was sufficiently accurate to assume that gamma varies linearly with ρ_0/ρ_s between $\gamma = 1.3966$ at $\rho_0/\rho_s = .52$ (or $p_s/p_0 = 2.578$) and standard conditions. We checked this assumption by determining gamma independently from the shock temperature and the thermochemical properties of air. The agreement was quite good. The values of gamma obtained in this way were quite smooth and needed only the slightest changes to eliminate small fluctuations. Having obtained gamma as a function of ρ_0/ρ_s we obtained the constant a by asserting that to a good approximation:

$$p/p_0 = (g+h)\,(\rho/\rho_0)^{\gamma}$$

Expanding $(\rho/\rho_0)^{\gamma}$ in the vicinity of $\rho/\rho_0 = 1$:

$$p/p_0 = (g+h)\left[2(\gamma-1)(\rho/\rho_0)^{1.5} + 1 - 2(\gamma-1)(\rho/\rho_0)\right]$$

so that

$$g/h = \frac{2(\gamma-1)}{1-2(\gamma-1)}$$

But p/p_o can also be written

$$p/p_o = b\left[a^{1.5}(\rho/\rho_0)^{1.5} + a(\rho/\rho_0)\right]$$

And

$$a = (g/h)^2 = \left[\frac{2(\gamma-1)}{1-2(\gamma-1)}\right]^2$$

Keeping ρ_0/ρ_s as the independent variable, we can express the shock pressure in the form:

$$p_s p_o = \left[1/\gamma + \frac{1-\rho_0/\rho_s}{1+\rho_0/\rho_s}\right] \Big/ \left[\frac{1-\rho_0/\rho_s}{1+\rho_0/\rho_s} - 1/\gamma\right]$$

Then the constant b is determined by the equation:

$$b = p_s/p_o \Big/ \left[a^{1.5}(\rho_s/\rho_o)^{1.5} + a(\rho_s/\rho_o)\right]$$

The values of the constants are given in Table IX.

In using this formulation for the equation of state, the velocity of sound o can be expressed in terms of the normal velocity of sound, $c_o = 3.472 \times 10^4$ cm/sec, by the relation:

$$c/c_o = \sqrt{(15/14)ab}\quad\sqrt{X^{1/2} + 2/3}$$

And the Riemannian variable $\sigma = (S)\int_{p_o}^{p} dp/(c\rho)$ is given by the equation:

$$\sigma/c_o = 4\sqrt{(15/14)ab}\left\{\sqrt{X^{1/2}+2/3} - \sqrt{X_o^{1/2}+2/3} - \frac{2}{\sqrt{6}}\log_e\frac{\sqrt{X^{1/2}+2/3}+\sqrt{2/3}}{\sqrt{X_o^{1/2}+2/3}+\sqrt{2/3}} + \frac{1}{2\sqrt{6}}\log_e(X/X_o)\right.$$

Here X_o is the value of X when $p/p_o = 1$ keeping the entropy constant, or X_o is the solution to the equation:

$$X_o^{3/2} + X_o = 1/b$$

Table 1. (T = 7,000° K)

ρ/ρ_o	α	$\bar{Z}$	$\eta = H/RT$	E/RT	p	$\Delta s/R$
1.981×10^{-2}	9.7913×10^{-1}	4.5887×10^{-4}	16.183	14.204	9.149×10^{-1}	30.94
2.398×10^{-2}	9.7852×10^{-1}	4.1695×10^{-4}	16.176	14.197	1.107	30.56
2.995×10^{-2}	9.6737×10^{-1}	3.7099×10^{-4}	16.032	14.065	1.375	29.97
3.816×10^{-2}	9.6082×10^{-1}	3.2756×10^{-4}	15.948	13.987	1.746	29.40
1.035×10^{-1}	9.1800×10^{-1}	1.9325×10^{-4}	15.380	13.471	4.630	26.86
3.295×10^{-1}	7.9222×10^{-1}	1.0115×10^{-4}	13.798	12.006	13.781	23.05
5.111×10^{-1}	7.3606×10^{-1}	7.8257×10^{-5}	13.084	11.348	20.705	21.52
8.913×10^{-1}	6.6225×10^{-1}	5.6101×10^{-5}	12.126	10.464	34.568	19.57

x_o	x_1	x_{02}
2.099×10^{-1}	9.522×10^{-5}	2.307×10^{-5}
2.099×10^{-1}	8.657×10^{-5}	2.794×10^{-5}
2.099×10^{-1}	7.791×10^{-5}	3.490×10^{-5}
2.098×10^{-1}	6.925×10^{-5}	4.446×10^{-5}
2.097×10^{-1}	4.325×10^{-5}	1.204×10^{-4}
2.092×10^{-1}	2.589×10^{-5}	3.817×10^{-4}
2.088×10^{-1}	2.153×10^{-5}	5.896×10^{-4}
2.079×10^{-1}	1.716×10^{-5}	1.020×10^{-3}

y_o	y_1	y_{n2}
7.679×10^{-1}	3.637×10^{-4}	1.087×10^{-2}
7.674×10^{-1}	3.304×10^{-4}	1.113×10^{-2}
7.564×10^{-1}	2.931×10^{-4}	1.665×10^{-2}
7.500×10^{-1}	2.583×10^{-4}	1.988×10^{-2}
6.968×10^{-1}	1.500×10^{-4}	4.152×10^{-2}
5.827×10^{-1}	7.526×10^{-5}	1.036×10^{-1}
5.270×10^{-1}	5.672×10^{-5}	1.315×10^{-1}
4.523×10^{-1}	3.895×10^{-5}	1.688×10^{-1}

Table 1. (T = 10,000° K)

ρ/ρ_0	α	Z	$\eta = H/RT$	E/RT	p	$\Delta s/R$
1.502×10^{-2}	1.0472	2.3782×10^{-2}	14.917	12.870	1.025	33.94
2.924×10^{-2}	1.0334	1.7099×10^{-2}	14.656	12.623	1.982	32.32
5.180×10^{-2}	1.0243	1.2871×10^{-2}	14.488	12.464	3.495	30.99
8.077×10^{-2}	1.0185	1.0317×10^{-2}	14.384	12.365	5.667	30.06
1.162×10^{-1}	1.0141	8.6046×10^{-2}	14.309	12.295	7.803	29.18
2.734×10^{-1}	1.0110	5.6268×10^{-3}	14.173	12.153	18.263	27.31

x_0	x_1	x_{02}
2.064×10^{-1}	3.556×10^{-3}	
2.075×10^{-1}	2.553×10^{-3}	3.322×10^{-7}
2.081×10^{-1}	1.920×10^{-3}	5.916×10^{-6}
2.084×10^{-1}	1.539×10^{-3}	8.958×10^{-6}
2.087×10^{-1}	1.284×10^{-3}	1.346×10^{-5}
2.091×10^{-1}	8.363×10^{-3}	3.487×10^{-5}

y_0	y_1	y_{n2}
7.694×10^{-1}	2.023×10^{-2}	1.904×10^{-4}
7.747×10^{-1}	1.455×10^{-2}	3.832×10^{-4}
7.776×10^{-1}	1.095×10^{-2}	7.258×10^{-4}
7.791×10^{-1}	8.778×10^{-3}	1.048×10^{-3}
7.796×10^{-1}	7.320×10^{-3}	1.519×10^{-3}
7.851×10^{-1}	4.791×10^{-4}	2.529×10^{-3}

Table 1. (T = 15,000° K)

ρ/ρ_o	α	Z	$\eta = H/RT$	E/RT	p	$\Delta s/R$
6.543×10^{-3}	2.0361	5.1804×10^{-1}	24.473	21.437	9.768×10^{-1}	52.31
1.195×10^{-2}	1.8371	4.168×10^{-1}	21.763	18.926	1.694	47.68
1.898×10^{-2}	1.7025	3.512×10^{-1}	19.928	17.226	2.565	44.51
3.761×10^{-2}	1.5318	2.660×10^{-1}	17.600	15.068	4.760	40.32
6.231×10^{-2}	1.4280	2.140×10^{-1}	15.183	13.754	7.564	37.62
1.300×10^{-1}	1.3078	1.539×10^{-1}	14.541	12.234	14.996	34.21
4.789×10^{-1}	1.1670	8.352×10^{-2}	12.618	10.450	51.880	29.33

x_0	x_1	x_2	x_{02}
1.231×10^{-1}	8.686×10^{-2}	1.663×10^{-8}	
1.428×10^{-1}	6.717×10^{-2}	8.573×10^{-9}	
1.552×10^{-1}	5.476×10^{-2}	5.241×10^{-9}	
1.700×10^{-1}	3.998×10^{-2}	2.551×10^{-9}	
1.785×10^{-1}	3.148×10^{-2}	1.507×10^{-9}	
1.879×10^{-1}	2.209×10^{-2}	7.049×10^{-10}	2.153×10^{-6}
1.983×10^{-1}	1.166×10^{-2}	1.860×10^{-10}	9.523×10^{-6}

y_0	y_1	y_2	y_{n2}
3.588×10^{-1}	4.312×10^{-1}	1.736×10^{-6}	
4.386×10^{-1}	3.514×10^{-1}	9.431×10^{-7}	
4.935×10^{-1}	2.965×10^{-1}	5.968×10^{-7}	
5.641×10^{-1}	2.259×10^{-1}	3.032×10^{-7}	
6.075×10^{-1}	1.825×10^{-1}	1.837×10^{-7}	
6.581×10^{-1}	1.318×10^{-1}	8.843×10^{-8}	5.706×10^{-5}
7.176×10^{-1}	7.186×10^{-2}	2.411×10^{-8}	2.529×10^{-4}

Table 1. (T = 20,000° K)

ρ/ρ_o	α	$\mathbb{Z}$	$\eta = H/RT$	E/RT	p	$\Delta S/R$
4.224×10^{-3}	2.8940	9.470×10^{-1}	29.5539	25.659	1.097	65.10
7.296×10^{-3}	2.8275	9.137×10^{-1}	28.8255	24.998	1.862	62.20
1.142×10^{-2}	2.7515	8.758×10^{-1}	28.0015	24.250	2.856	59.61
2.565×10^{-2}	2.5594	7.797×10^{-1}	25.9234	22.364	6.087	54.49
6.240×10^{-2}	2.2820	6.410×10^{-1}	22.9220	19.640	13.655	48.12
2.381×10^{-1}	1.8400	4.200×10^{-1}	19.5430	16.703	45.080	38.91

x_0	x_1	x_2
1.744×10^{-2}	1.925×10^{-1}	4.173×10^{-5}
2.755×10^{-2}	1.824×10^{-1}	2.372×10^{-5}
3.878×10^{-2}	1.712×10^{-1}	1.484×10^{-5}
6.547×10^{-2}	1.445×10^{-1}	6.264×10^{-6}
9.982×10^{-2}	1.102×10^{-1}	2.388×10^{-6}
1.457×10^{-1}	6.432×10^{-2}	5.576×10^{-7}

y_0	y_1	y_2
3.674×10^{-2}	7.521×10^{-1}	1.185×10^{-3}
5.943×10^{-2}	7.299×10^{-1}	6.898×10^{-4}
8.593×10^{-2}	7.036×10^{-1}	4.434×10^{-4}
1.551×10^{-1}	6.348×10^{-1}	2.000×10^{-4}
2.592×10^{-1}	5.307×10^{-1}	8.359×10^{-5}
4.344×10^{-1}	3.557×10^{-1}	2.241×10^{-5}

Table 1. (T = 25,000° K)

ρ/ρ_o	α	Z	$\eta = H/RT$	E/RT	p	$\Delta s/R$
3.157×10^{-3}	3.118	1.0559	28.481	24.369	1.082	70.15
4.847×10^{-3}	3.0633	1.0316	27.742	23.679	1.641	67.62
1.001×10^{-2}	2.9971	9.9853×10^{-1}	26.828	22.831	3.336	63.73
2.073×10^{-2}	2.9294	9.6471×10^{-1}	26.048	22.119	6.789	60.09
4.364×10^{-2}	2.8333	9.1663×10^{-1}	25.087	21.254	13.940	56.03
1.241×10^{-1}	2.6121	8.0605×10^{-1}	23.014	19.402	37.344	49.81
2.970×10^{-1}	2.3468	6.7341×10^{-1}	20.569	17.222	82.833	44.02

x_o	x_1	x_2
2.032×10^{-3}	2.036×10^{-1}	4.335×10^{-3}
3.054×10^{-3}	2.041×10^{-1}	2.896×10^{-3}
6.062×10^{-3}	2.025×10^{-1}	1.437×10^{-3}
1.182×10^{-2}	1.975×10^{-1}	7.007×10^{-4}
2.242×10^{-2}	1.873×10^{-1}	3.322×10^{-4}
4.835×10^{-2}	1.615×10^{-1}	1.146×10^{-4}
7.863×10^{-2}	1.313×10^{-1}	4.660×10^{-5}

y_o	y_1	y_2	y_3
5.563×10^{-3}	7.252×10^{-1}	5.918×10^{-2}	3.061×10^{-7}
8.527×10^{-3}	7.412×10^{-1}	4.032×10^{-2}	1.390×10^{-7}
1.731×10^{-2}	7.523×10^{-1}	2.046×10^{-2}	3.528×10^{-8}
3.431×10^{-2}	7.456×10^{-1}	1.014×10^{-2}	8.740×10^{-9}
6.617×10^{-2}	7.189×10^{-1}	4.889×10^{-3}	2.107×10^{-9}
1.475×10^{-1}	6.408×10^{-1}	1.743×10^{-3}	3.005×10^{-10}
2.487×10^{-1}	5.405×10^{-1}	7.351×10^{-4}	6.337×10^{-11}

Table 1. (T = 30,000 °K)

ρ/ρ_0	α	Z	$\eta = H/RT$	E/RT	p	$\Delta s/R$
2.270×10^{-3}	3.9354	1.4677	37.093	32.158	1.121	85.17
3.650×10^{-3}	3.7428	1.3714	34.345	29.602	1.730	79.97
8.140×10^{-3}	3.4566	1.2283	30.293	25.836	3.628	71.99
1.778×10^{-3}	3.2496	1.1248	27.399	23.149	7.556	65.55
3.296×10^{-2}	3.1362	1.0681	25.833	21.697	13.633	61.35
1.004×10^{-1}	2.9868	9.934×10^{-1}	24.037	20.050	40.012	54.91

x_0	x_1	x_2	x_3
4.366×10^{-4}	1.474×10^{-1}	6.216×10^{-2}	3.763×10^{-6}
7.257×10^{-4}	1.633×10^{-1}	4.593×10^{-2}	1.851×10^{-6}
1.624×10^{-3}	1.828×10^{-1}	2.570×10^{-2}	5.197×10^{-7}
3.430×10^{-3}	1.930×10^{-1}	7.356×10^{-3}	7.372×10^{-7}
6.131×10^{-3}	1.960×10^{-1}	7.830×10^{-3}	6.131×10^{-8}
1.687×10^{-2}	1.904×10^{-1}	2.683×10^{-3}	5.433×10^{-9}

y_0	y_1	y_2	y_3
3.225×10^{-4}	3.835×10^{-1}	4.061×10^{-1}	1.081×10^{-4}
5.838×10^{-4}	4.627×10^{-1}	3.266×10^{-1}	5.795×10^{-5}
1.471×10^{-3}	5.828×10^{-1}	2.057×10^{-1}	1.825×10^{-5}
3.374×10^{-3}	6.686×10^{-1}	1.180×10^{-1}	5.230×10^{-6}
6.326×10^{-3}	7.122×10^{-1}	7.143×10^{-2}	1.771×10^{-6}
1.874×10^{-2}	7.449×10^{-1}	2.637×10^{-2}	1.874×10^{-7}

Table 1. (T = 40,000°K)

ρ/ρ_o	α	Z	$\eta = H/RT$	E/RT	p	$\Delta s/R$
1.243×10^{-3}	5.0210	2.0105	43.839	37.818	9.983×10^{-1}	105.87
2.556×10^{-3}	4.9121	1.9560	42.371	36.459	2.015	99.97
5.303×10^{-3}	4.7717	1.8856	40.652	34.880	4.081	93.81
1.122×10^{-2}	4.5641	1.7820	38.223	32.659	8.326	86.88
2.445×10^{-2}	4.2726	1.6363	34.874	29.601	17.186	78.96
7.111×10^{-2}	3.8123	1.4062	29.633	24.821	45.631	67.83
1.604×10^{-1}	3.4940	1.2469	26.052	21.558	95.107	60.14
4.578×10^{-1}	3.1841	1.0921	22.691	18.507	255.43	51.94
9.936×10^{-1}	3.0129	1.0064	21.100	16.997	531.63	46.95

x_0	x_1	x_2	x_3	x_4
2.971×10^{-6}	7.670×10^{-3}	1.974×10^{-1}	4.913×10^{-3}	4.372×10^{-8}
1.160×10^{-5}	1.496×10^{-2}	1.926×10^{-1}	2.397×10^{-3}	1.066×10^{-8}
4.352×10^{-5}	2.808×10^{-2}	1.807×10^{-1}	1.125×10^{-3}	2.502×10^{-9}
1.538×10^{-4}	4.964×10^{-2}	1.597×10^{-1}	4.969×10^{-4}	5.526×10^{-10}
4.973×10^{-4}	8.023×10^{-2}	1.291×10^{-1}	2.008×10^{-4}	1.117×10^{-10}
1.961×10^{-3}	1.266×10^{-1}	8.143×10^{-2}	5.065×10^{-5}	1.127×10^{-11}
4.811×10^{-3}	1.552×10^{-1}	4.995×10^{-2}	1.554×10^{-5}	1.728×10^{-13}
1.349×10^{-2}	1.741×10^{-1}	2.241×10^{-2}	2.788×10^{-6}	1.204×10^{-13}
2.669×10^{-2}	1.722×10^{-1}	1.108×10^{-2}	6.896×10^{-7}	1.534×10^{-14}

y_0	y_1	y_2	y_3	y_4
2.561×10^{-6}	2.549×10^{-2}	7.258×10^{-1}	3.876×10^{-2}	3.068×10^{-7}
1.017×10^{-5}	5.058×10^{-2}	7.202×10^{-1}	1.923×10^{-2}	7.610×10^{-8}
3.866×10^{-5}	9.617×10^{-2}	6.847×10^{-1}	9.140×10^{-3}	1.809×10^{-8}
1.385×10^{-4}	1.723×10^{-1}	6.134×10^{-1}	4.095×10^{-3}	4.052×10^{-9}
4.557×10^{-4}	2.834×10^{-1}	5.044×10^{-1}	1.684×10^{-3}	8.329×10^{-10}
1.850×10^{-3}	4.601×10^{-1}	3.276×10^{-1}	4.373×10^{-4}	8.654×10^{-11}
4.655×10^{-3}	5.791×10^{-1}	2.061×10^{-1}	1.376×10^{-4}	1.361×10^{-11}
1.366×10^{-2}	6.796×10^{-1}	9.675×10^{-2}	2.583×10^{-5}	1.023×10^{-12}
2.857×10^{-2}	7.108×10^{-1}	5.060×10^{-2}	6.756×10^{-6}	1.337×10^{-13}

Table 1. (T = 50,000° K)

ρ/ρ_0	α	~~Z~~	$\eta = H/RT$	E/RT	p	$\Delta S/R$
8.683×10^{-4}	6.1187	2.5594	49.0228	41.904	1.030	126.66
2.128×10^{-3}	5.6993	2.3496	44.2390	37.540	2.376	114.09
4.538×10^{-3}	5.4073	2.2037	40.8971	34.490	4.846	104.73
7.107×10^{-3}	5.1883	2.0942	38.4691	32.281	9.850	99.77
1.920×10^{-2}	5.0236	2.0118	36.7417	30.781	1.996×10	89.87
5.251×10^{-2}	4.8090	1.9045	34.7683	28.960	5.084×10	81.09
1.114×10^{-1}	4.5895	1.7948	32.9478	27.358	1.038×10^2	73.88
1.427×10^{-1}	4.5021	1.7511	32.2438	26.741	1.309×10^2	71.38
1.975×10^{-1}	4.3759	1.6880	31.2408	25.865	1.769×10^2	68.02

x_0	x_1	x_2	x_3	x_4
3.903×10^{-8}	3.486×10^{-4}	1.080×10^{-1}	1.016×10^{-1}	1.266×10^{-4}
2.696×10^{-7}	1.074×10^{-3}	1.473×10^{-1}	6.159×10^{-2}	3.412×10^{-5}
1.257×10^{-6}	2.494×10^{-3}	1.716×10^{-1}	3.588×10^{-2}	9.940×10^{-6}
5.425×10^{-6}	5.384×10^{-3}	1.852×10^{-1}	1.936×10^{-2}	2.682×10^{-6}
2.215×10^{-5}	1.099×10^{-2}	1.891×10^{-1}	9.883×10^{-3}	6.845×10^{-7}
1.317×10^{-4}	2.615×10^{-2}	1.800×10^{-1}	3.762×10^{-3}	1.042×10^{-7}
4.716×10^{-4}	4.681×10^{-2}	1.610×10^{-1}	1.683×10^{-3}	2.332×10^{-8}
6.982×10^{-4}	5.544×10^{-2}	1.526×10^{-1}	1.276×10^{-3}	1.414×10^{-8}
1.140×10^{-3}	6.787×10^{-2}	1.401×10^{-1}	8.788×10^{-4}	7.304×10^{-9}

y_0	y_1	y_2	y_3	y_4
2.822×10^{-8}	1.026×10^{-3}	3.387×10^{-1}	4.450×10^{-1}	5.247×10^{-3}
2.091×10^{-7}	3.380×10^{-3}	4.956×10^{-1}	2.895×10^{-1}	1.517×10^{-3}
1.020×10^{-6}	8.247×10^{-3}	6.048×10^{-1}	1.766×10^{-1}	4.626×10^{-4}
4.544×10^{-6}	1.836×10^{-2}	6.732×10^{-1}	9.829×10^{-2}	1.288×10^{-4}
1.892×10^{-5}	3.822×10^{-2}	7.006×10^{-1}	5.114×10^{-2}	3.350×10^{-5}
1.144×10^{-4}	9.241×10^{-2}	6.777×10^{-1}	1.979×10^{-2}	5.185×10^{-6}
4.140×10^{-4}	1.673×10^{-1}	6.133×10^{-1}	8.955×10^{-3}	1.173×10^{-6}
6.155×10^{-4}	1.990×10^{-1}	5.836×10^{-1}	6.817×10^{-3}	7.144×10^{-7}
1.011×10^{-3}	2.451×10^{-1}	5.392×10^{-1}	4.723×10^{-5}	3.712×10^{-7}

Table 1. (T = 71,000° K)

ρ/ρ_o	α	$\not{\alpha}$	$\eta = H/RT$	E/RT	p	$\Delta s/R$
4.442×10^{-4}	8.5038	3.7519	78.2438	68.740	9.91×10^{-1}	175.34
9.202×10^{-4}	8.2450	3.6225	74.3200	65.075	2.013	164.18
1.416×10^{-3}	8.0604	3.5302	71.5634	62.503	3.037	157.20
2.989×10^{-3}	7.6896	3.3448	66.1486	57.459	6.148	144.60
6.381×10^{-3}	7.2684	3.1342	60.2824	52.014	12.487	131.70
1.374×10^{-2}	6.8206	2.9103	54.4876	46.667	25.439	117.93
3.837×10^{-2}	6.2126	2.6063	47.3266	40.114	65.494	103.42
8.368×10^{-2}	5.8804	2.3902	41.6904	34.810	134.27	92.68
2.316×10^{-1}	5.5180	2.1590	37.9800	31.462	346.28	80.65

x_0	x_1	x_2	x_3	x_4	x_5	x_6
3.631×10^{-12}	1.861×10^{-7}	1.444×10^{-3}	1.320×10^{-1}	7.527×10^{-2}	1.332×10^{-3}	1.049×10^{-7}
3.529×10^{-11}	9.044×10^{-7}	3.510×10^{-3}	1.604×10^{-1}	4.573×10^{-2}	4.046×10^{-4}	1.594×10^{-8}
1.274×10^{-10}	2.177×10^{-6}	5.633×10^{-3}	1.716×10^{-1}	3.262×10^{-2}	1.924×10^{-4}	5.051×10^{-9}
1.075×10^{-9}	9.181×10^{-6}	1.188×10^{-2}	1.809×10^{-1}	1.720×10^{-2}	5.070 z 10^{-5}	6.657×10^{-10}
8.467×10^{-9}	3.616×10^{-5}	2.339×10^{-2}	1.781×10^{-1}	8.465×10^{-3}	1.248×10^{-5}	8.193×10^{-11}
6.205×10^{-8}	1.325×10^{-4}	4.285×10^{-2}	1.631×10^{-1}	3.877×10^{-3}	2.858×10^{-6}	9.382×10^{-12}
7.467×10^{-7}	6.378 x 01-4	8.252×10^{-2}	1.275×10^{-1}	1.195×10^{-3}	3.522×10^{-7}	4.624×10^{-13}
4.269×10^{-6}	1.823×10^{-3}	1.180×10^{-1}	8.980×10^{-2}	4.268×10^{-4}	6.293×10^{-8}	4.131×10^{-14}
3.535×10^{-5}	6.039×10^{-3}	1.562×10^{-1}	4.759×10^{-2}	9.049×10^{-5}	5.337×10^{-9}	1.401×10^{-15}

y_0	y_1	y_2	y_3	y_4	y_5
1.296×10^{-12}	2.885×10^{-7}	1.634×10^{-3}	1.157×10^{-1}	6.684×10^{-1}	4.331×10^{-3}
1.803×10^{-11}	2.007×10^{-6}	5.684×10^{-3}	2.012×10^{-1}	5.813×10^{-1}	1.883×10^{-3}
8.039×10^{-11}	5.965×10^{-6}	1.126×10^{-2}	2.658×10^{-1}	5.119×10^{-1}	1.106×10^{-3}
9.330×10^{-10}	3.462×10^{-5}	3.268×10^{-2}	3.856×10^{-1}	3.713×10^{-1}	4.010×10^{-4}
9.260×10^{-9}	1.718×10^{-4}	8.107×10^{-2}	4.783×10^{-1}	2.303×10^{-1}	1.244×10^{-4}
7.737×10^{-8}	7.177×10^{-4}	1.694×10^{-1}	4.996×10^{-1}	1.203×10^{-1}	3.248×10^{-5}
9.789×10^{-7}	3.632×10^{-3}	3.429×10^{-1}	4.046×10^{-1}	3.896×10^{-2}	4.207×10^{-6}
5.503×10^{-6}	1.021×10^{-2}	4.818×10^{-1}	2.842×10^{-1}	1.369×10^{-2}	7.391×10^{-7}
4.359×10^{-5}	3.235×10^{-2}	6.107×10^{-1}	1.441×10^{-1}	2.776×10^{-3}	5.995×10^{-8}

Table 1. (T = 101,400° K)

ρ/ρ_o	α	Z	$\eta = H/RT$	E/RT	p	$\Delta S/R$
2.518×10^{-4}	10.9274	4.9637	92.6380	80.710	1.015	227.08
5.862×10^{-4}	10.7484	4.8742	89.9279	78.180	2.328	214.16
8.293×10^{-4}	10.6468	4.8234	88.4906	76.844	3.265	207.96
1.411×10^{-3}	10.4488	4.7244	85.6726	74.224	5.461	198.36
2.548×10^{-2}	8.8502	3.9251	62.4165	52.566	8.482×10	146.34
6.834×10^{-2}	8.3163	3.6582	57.7425	48.426	2.152×10^{2}	125.65
9.371×10^{-2}	8.1144	3.5572	55.6525	46.438	2.887×10^{2}	119.96
1.469×10^{-1}	7.8066	3.4033	52.2169	43.410	4.373×10^{2}	114.01
3.238×10^{-1}	7.1764	3.0882	45.7550	37.579	8.949×10^{2}	97.57

x_o	x_1	x_2	x_3	x_4	x_5	x_6
4.004×10^{-18}	9.096×10^{-13}	9.488×10^{-8}	2.732×10^{-4}	1.572×10^{-2}	1.674×10^{-1}	2.657×10^{-2}
2.424×10^{-16}	2.409×10^{-11}	1.038×10^{-6}	1.385×10^{-3}	3.487×10^{-2}	1.624×10^{-1}	1.128×10^{-2}
1.233×10^{-15}	8.753×10^{-11}	2.693×10^{-6}	2.567×10^{-3}	4.617×10^{-2}	1.536×10^{-1}	7.621×10^{-3}
1.374×10^{-14}	5.853×10^{-10}	1.081×10^{-5}	6.181×10^{-3}	6.669×10^{-2}	1.332×10^{-1}	3.963×10^{-3}
8.556×10^{-10}	2.430×10^{-6}	2.991×10^{-3}	1.140×10^{-1}	8.203×10^{-2}	1.092×10^{-2}	2.166×10^{-5}
1.799×10^{-8}	2.043×10^{-5}	6.598×10^{-3}	1.534×10^{-1}	4.414×10^{-2}	2.351×10^{-3}	1.865×10^{-6}
4.447×10^{-8}	3.789×10^{-5}	1.399×10^{-2}	1.601×10^{-1}	3.458×10^{-2}	1.379×10^{-3}	8.210×10^{-7}
1.539×10^{-7}	8.744×10^{-5}	2.152×10^{-2}	1.641×10^{-1}	2.361×10^{-2}	6.287×10^{-4}	2.495×10^{-7}
1.178×10^{-6}	3.346×10^{-4}	4.118×10^{-2}	1.570×10^{-1}	1.130×10^{-2}	1.504×10^{-4}	2.983×10^{-8}

y_1	y_2	y_3	y_4	y_5
7.752×10^{-13}	4.251×10^{-8}	7.570×10^{-5}	4.647×10^{-2}	7.435×10^{-1}
1.967×10^{-11}	4.717×10^{-7}	3.675×10^{-4}	9.870×10^{-2}	6.909×10^{-1}
7.192×10^{-11}	1.232×10^{-6}	6.858×10^{-4}	1.316×10^{-1}	6.578×10^{-1}
4.988×10^{-10}	5.128×10^{-6}	1.712×10^{-3}	1.971×10^{-1}	5.912×10^{-1}
5.050×10^{-6}	3.462×10^{-3}	7.705×10^{-2}	5.912×10^{-1}	1.182×10^{-1}
7.309×10^{-5}	2.004×10^{-2}	1.784×10^{-1}	5.476×10^{-1}	4.381×10^{-2}
1.602×10^{-4}	3.295×10^{-2}	2.200×10^{-1}	5.065×10^{-1}	3.038×10^{-2}
4.586×10^{-4}	6.287×10^{-2}	2.799×10^{-1}	4.296×10^{-1}	1.718×10^{-2}
2.313×10^{-3}	1.585×10^{-1}	3.529×10^{-1}	2.708×10^{-1}	5.416×10^{-3}

Table 1. (T = 140,000° K)

ρ/ρ_o	α	Z	$\eta = H/RT$	E/RT	p	$\Delta S/R$
9.501×10^{-3}	11.0246	5.0123	76.6523	64.628	53.311	186.16
1.843×10^{-2}	10.8649	4.9324	74.7440	62.879	102.05	176.00
4.172×10^{-2}	10.5872	4.7936	71.5920	60.005	225.61	162.78
1.101×10^{-1}	10.0825	4.5412	66.1036	55.021	569.43	140.81
2.333×10^{-1}	9.5731	4.2865	60.7488	50.176	1151.07	131.08
3.110×10^{-1}	9.4975	4.2487	59.4109	48.913	1523.33	127.06

x_1	x_2	x_3	x_4	x_5	x_6
3.049×10^{-11}	3.870×10^{-7}	2.834×10^{-4}	7.986×10^{-3}	1.315×10^{-1}	7.021×10^{-2}
4.608×10^{-10}	3.064×10^{-6}	1.175×10^{-3}	1.735×10^{-2}	1.496×10^{-1}	4.184×10^{-2}
1.067×10^{-8}	3.223×10^{-5}	5.619×10^{-3}	3.771×10^{-2}	1.478×10^{-1}	1.879×10^{-2}
3.067×10^{-7}	3.708×10^{-4}	2.586×10^{-2}	6.940×10^{-2}	1.089×10^{-1}	5.534×10^{-3}
2.889×10^{-6}	1.746×10^{-3}	6.087×10^{-2}	8.169×10^{-2}	6.407×10^{-2}	1.629×10^{-3}
6.520×10^{-6}	2.982×10^{-3}	7.870×10^{-2}	7.994×10^{-2}	4.745×10^{-2}	9.131×10^{-4}

y_1	y_2	y_3	y_4	y_5
7.917×10^{-11}	4.576×10^{-7}	1.581×10^{-4}	4.906×10^{-2}	7.408×10^{-1}
9.949×10^{-10}	3.078×10^{-6}	5.452×10^{-4}	8.861×10^{-2}	7.008×10^{-1}
2.049×10^{-8}	2.882×10^{-5}	2.320×10^{-3}	1.714×10^{-1}	6.162×10^{-1}
5.967×10^{-7}	3.357×10^{-4}	1.081×10^{-2}	3.195×10^{-1}	4.594×10^{-1}
6.592×10^{-6}	1.854×10^{-3}	2.985×10^{-2}	4.411×10^{-1}	3.171×10^{-1}
1.659×10^{-5}	3.532×10^{-3}	4.304×10^{-2}	4.814×10^{-1}	2.620×10^{-1}

Table 1. (T = 180,000° K)

ρ/ρ_o	α	Z	$\eta = H/RT$	E/RT	p	$\Delta s/R$
1.288×10^{-2}	11.3513	5.1756	66.7891	54.438	95.457	183.79
1.938×10^{-2}	11.3211	5.1606	66.4668	54.146	143.253	178.15
3.905×10^{-2}	11.2428	5.1214	65.6355	53.393	286.862	168.80
9.930×10^{-2}	11.0704	5.0352	63.8590	51.788	719.161	155.36
2.026×10^{-1}	11.6716	4.8358	61.6165	50.022	1443.120	144.51
2.723×10^{-1}	10.5943	4.7971	60.8636	49.269	1926.720	140.20
3.099×10^{-1}	10.3104	4.6552	59.9842	48.673	2177.480	137.68
3.452×10^{-1}	10.2700	4.6350	59.5648	48.294	2417.190	135.97

x_2	x_3	x_4	x_5	x_6
7.243×10^{-10}	1.516×10^{-6}	1.850×10^{-4}	2.582×10^{-2}	1.840×10^{-1}
3.450×10^{-9}	4.815×10^{-6}	3.916×10^{-4}	3.645×10^{-2}	1.731×10^{-1}
4.681×10^{-8}	3.226×10^{-5}	1.328×10^{-3}	6.182×10^{-2}	1.468×10^{-1}
1.238×10^{-6}	3.455×10^{-4}	5.621×10^{-3}	1.046×10^{-1}	9.940×10^{-2}
1.246×10^{-5}	1.738×10^{-3}	1.414×10^{-2}	1.316×10^{-1}	6.251×10^{-2}
3.093×10^{-5}	3.238×10^{-2}	1.975×10^{-2}	1.378×10^{-1}	4.812×10^{-2}
4.492×10^{-5}	4.166×10^{-3}	2.252×10^{-2}	1.393×10^{-1}	4.397×10^{-2}
6.158×10^{-5}	5.148×10^{-3}	2.509×10^{-2}	1.399×10^{-1}	3.981×10^{-2}

y_2	y_3	y_4	y_5
7.060×10^{-9}	5.952×10^{-6}	8.149×10^{-3}	7.818×10^{-1}
2.403×10^{-8}	1.351×10^{-5}	1.232×10^{-2}	7.886×10^{-1}
1.868×10^{-7}	5.248×10^{-5}	2.395×10^{-2}	7.660×10^{-1}
2.790×10^{-6}	3.136×10^{-4}	5.726×10^{-2}	7.324×10^{-1}
2.079×10^{-5}	1.168×10^{-3}	1.067×10^{-1}	6.822×10^{-1}
4.710×10^{-5}	1.985×10^{-3}	1.360×10^{-1}	6.520×10^{-1}
6.618×10^{-5}	2.472×10^{-3}	1.500×10^{-1}	6.375×10^{-1}
8.844×10^{-5}	2.978×10^{-3}	1.629×10^{-1}	6.241×10^{-1}

Table 1. (T = 246,250° K)

ρ/ρ_o	α	~~Z~~	$\eta = H/RT$	E/RT	p	$\Delta S/R$
1.280×10^{-2}	11.4148	5.2074	57.8678	45.453	130.46	188.47
3.845×10^{-2}	11.4046	5.2023	57.7816	45.377	391.45	174.72
1.933×10^{-1}	11.3468	5.1734	57.3028	44.953	1959.00	154.14
2.583×10^{-1}	11.3242	5.1621	57.1172	44.786	2612.90	150.34
3.558×10^{-1}	11.2920	5.1460	56.8530	44.544	3589.90	146.07

x_3	x_4	x_5	x_6
1.376×10^{-9}	1.028×10^{-6}	1.655×10^{-3}	2.084×10^{-1}
3.657×10^{-8}	9.106×10^{-6}	4.886×10^{-3}	2.051×10^{-1}
4.178×10^{-6}	2.081×10^{-4}	2.233×10^{-2}	1.875×10^{-1}
9.557×10^{-6}	3.570×10^{-4}	2.873×10^{-2}	1.809×10^{-1}
2.351×10^{-5}	6.395×10^{-4}	3.718×10^{-2}	1.719×10^{-1}

y_2	y_3	y_4	y_5	y_6
3.570×10^{-11}	1.096×10^{-7}	9.362×10^{-4}	7.890×10^{-1}	2.403×10^{-5}
9.617×10^{-10}	9.838×10^{-7}	2.802×10^{-3}	7.872×10^{-1}	7.990×10^{-6}
1.185×10^{-7}	2.425×10^{-5}	1.381×10^{-2}	7.762×10^{-1}	1.576×10^{-6}
2.793×10^{-7}	4.286×10^{-5}	1.831×10^{-2}	7.716×10^{-1}	1.175×10^{-6}
7.171×10^{-7}	8.013×10^{-5}	2.493×10^{-2}	7.650×10^{-1}	8.482×10^{-7}

Table II

T \ ρ/ρ_0	20	11	10	8	5
			$p/\rho/\rho_0$		
1,000,000		46,081		46,798	
900,000		40,140		40,739	
800,000		34,277		34,793	
750,000		31,840		32,273	
700,000		29,088		29,470	
650,000		26,519		26,854	
600,000		24,013		24,303	
550,000		21,545		21,790	
500,000		19,186		19,391	
450,000		16,950		17,117	
400,000		14,938		15,071	
350,000		12,804		12,904	
300,000		10,811		10,897	
250,000		8,559.4		8,640.1	
200,000		5,909.7		6,033.3	
180,000		5,039.8		5,159.3	5,346.3
160,000		4,270.7		4,365.1	
140,000		3,476.2		3,564.8	3,640.9
120,000		2,674.9		2,754.2	
100,000		1,932.4		1,999.0	
90,000		1,573.0		1,632.2	
80,000		1,263.8		1,310.6	
70,000		1,037.8		1,074.7	
60,000		821.95		849.29	
50,000		621.91		641.14	663.80
45,000		524.58		540.22	
40,000		433.00		445.58	
35,000		345.37		355.26	
30,000		269.71		277.43	281.65
25,000	189.99	195.17	198.62	201.13	209.49
24,000			186.75		
22,000			158.53		
20,000	140.47	141.44	141.70	142.54	147.22
18,000			125.37		
16,000			108.65		
15,000	90.86	100.08	101.07	101.53	102.21
12,000	75.30		77.40		78.74
10,000	57.01	59.75	60.19	61.06	62.65
9,000					
8,000	37.65		40.14		42.82
7,000	29.60	32.86	32.34	32.61	32.21
6,500	26.22		27.36		28.66
6,000	23.18		23.92		24.87
5,500	20.36		20.94		21.61
5,000			18.23		18.68

Table II continued.

$p/\rho/\rho_0$

T \ ρ/ρ_0	20	11	10	8	5
4,500			15.83		16.13
4,000			13.70		13.83
3,500			11.78		11.84
3,000			10.01		10.04
2,500			8.34		8.34
2,000			6.67		6.67
1,500			5.00		5.00
1,000			3.33		3.33

T \ ρ/ρ_0	4	2	1	0.8
1,000,000	48,358	49,918	51,478	
900,000	42,038	43,339	44,639	
800,000	35,914	37,037	38,159	
750,000	33,217	34,241	35,104	
700,000	30,302	31,135	31,967	
650,000	27,582	28,310	29,037	
600,000	24,935	25,565	26,198	
550,000	22,325	22,859	23,393	
500,000	19,838	20,286	20,733	20,877
450,000	17,481	17,844	18,208	18,325
400,000	15,362	15,653	15,943	16,037
350,000	13,120	13,336	13,553	13,622
300,000	11,084	11,272	11,459	11,519
250,000	8,815.7	9,032.1	9,166.9	9,223.5
200,000	6,302.2	6,571.2	6,840.1	6,926.7
180,000	5,419.3	5,679.5	5,939.6	6,023.4
160,000	4,570.5	4,776.0	4,981.6	5,047.7
140,000	3,757.9	3,950.9	4,144.0	4,206.1
120,000	2,926.8	3,099.6	3,272.2	3,327.8
100,000	2,143.9	2,288.8	2,433.7	2,480.4
90,000	1,758.2	1,884.3	2,010.4	2,051.0
80,000	1,412.3	1,514.1	1,615.9	1,648.6
70,000	1,155.0	1,235.4	1,405.6	1,341.6
60,000	908.96	968.54	1,028.1	1,047.3
50,000	682.98	724.84	766.69	780.17
45,000	574.13	608.09	642.04	652.97
40,000	473.07	500.54	527.99	536.84
35,000	376.84	398.40	419.97	426.91
30,000	294.31	311.17	328.03	333.46
25,000	214.06	227.02	239.96	244.12
24,000			226.93	
22,000			194.66	
20,000	148.20	156.29	163.39	165.45

Table II continued.

$p/\rho/\rho_0$

T \ ρ/ρ_0	4	2	1	0.8
18,000			137.77	
16,000			115.13	
15,000	102.48	103.53	105.23	106.35
12,000		79.81	80.31	
10,000	64.36	64.76	65.95	66.32
9,000		56.26	57.80	
8,000		46.36	48.68	
7,000	33.36	35.64	37.93	39.06
6,500		30.71	32.53	
6,000		26.31	27.62	
5,500		22.62	23.49	
5,000		19.40	20.01	
4,500		16.57	17.03	
4,000		14.07	14.33	
3,500		11.93	12.02	
3,000		10.06	10.08	
2,500		8.34	8.34	
2,000		6.67	6.67	
1,500		5.00	5.00	
1,000		3.33	3.33	

T \ ρ/ρ_0	0.6	0.4	0.2	0.1
500,000	21,078	21,325	21,772	22,220
450,000	18,476	18,689	19,052	19,416
400,000	16,157	16,327	16,618	16,908
350,000	13,712	13,838	14,055	14,272
300,000	11,597	11,708	11,895	12,082
250,000	9,296.3	9,398.8	9,574.9	9,750.2
200,000	7,038.3	7,195.1	7,464.7	7,733.4
180,000	6,131.3	6,283.8	6,543.5	6,804.2
160,000	5,133.0	5,253.0	5,458.8	5,663.7
140,000	4,286.2	4,399.2	4,592.4	4,785.7
120,000	3,399.5	3,500.5	3,673.0	3,845.6
100,000	2,540.5	2,625.1	2,769.8	2,914.5
90,000	2,103.4	2,176.7	2,302.5	2,429.2
80,000	1,690.9	1,750.7	1,852.3	1,953.8
70,000	1,374.9	1,421.8	1,502.7	1,582.6
60,000	1,072.1	1,107.2	1,166.5	1,225.8
50,000	797.54	822.05	863.66	905.90
45,000	667.06	686.89	720.86	754.92
40,000	548.23	564.30	591.71	619.21
35,000	435.86	448.46	470.03	491.60
30,000	340.45	350.32	367.13	384.02
25,000	249.50	257.03	269.97	283.01

Table II continued.

$p/\rho/\rho_0$

T \ ρ/ρ_0	0.6	0.4	0.2	0.1
24,000				267.10
22,000				230.79
20,000	166.76	171.19	178.99	182.89
18,000				150.18
16,000				121.60
15,000	107.42	108.79	109.54	110.09
12,000				83.22
10,000	66.70	66.78	66.91	67.23
9,000				65.34
8,000				57.25
7,000	39.92	41.24	42.73	44.76
6,500				37.75
6,000				31.28
5,500				26.06
5,000				21.84
4,500				18.24
4,000				14.95
3,500				12.31
3,000				10.16
2,500				8.34
2,000				6.67

T \ ρ/ρ_0	0.05	0.02	0.01	0.005
300,000	12,269	12,517	12,704	
250,000	9,925.4	10,158	10,333	
200,000	8,002.2	8,357.8	8,627.7	
180,000	7,063.9	7,407.9	7,668.0	
160,000	5,869.5	6,141.1	6,346.6	6,608.3
140,000	4,978.0	5,233.4	5,466.9	5,619.7
120,000	4,018.2	4,336.4	4,419.2	4,591.5
100,000	3,059.2	3,251.2	3,396.1	3,409.4
90,000	2,555.0	2,721.5	2,847.6	2,973.8
80,000	2,056.3	2,190.4	2,292.2	2,394.2
70,000	1,663.5	1,769.5	1,849.8	1,930.4
60,000	1,286.1	1,364.4	1,424.0	1,483.8
50,000	947.25	1,002.9	1,044.8	1,086.5
45,000	789.07	833.65	867.62	901.41
40,000	647.07	682.93	710.43	737.93
35,000	513.17	541.66	563.22	584.79
30,000	400.83	423.11	440.01	456.55
25,000	295.68	313.02	325.96	338.82
24,000			307.27	
22,000			266.92	

Table II continued.

$p/\rho/\rho_0$

T \ ρ/ρ_0	0.05	0.02	0.01	0.005
20,000	191.00	203.02	212.46	218.34
18,000			162.58	
16,000			128.07	
15,000	111.02	112.45	114.95	
12,000			86.10	
10,000	67.40	68.04	76.57	
9,000			72.89	
8,000			65.79	
7,000	45.38		51.49	
6,500			37.75	
6,000			34.96	
5,500			28.58	
5,000			23.55	
4,500			19.41	
4,000			15.55	
3,500			12.51	
3,000			10.23	
2,500			8.34	
2,000			6.67	

T \ ρ/ρ_0	0.002	0.001	0.0001	0.00001
140,000	5,748.9	6,038.1		
120,000	4,819.8	4,992.3	5,566.6	
100,000	3,732.4	3,877.1	4,358.8	
90,000	3,140.1	3,266.8	3,685.6	
80,000	2,528.1	2,630.5	2,968.5	
70,000	2,036.5	2,116.5	2,383.4	
60,000	1,562.0	1,622.2	1,819.9	
50,000	1,142.3	1,183.6	1,322.9	
45,000	946.35	980.50	1,092.8	
40,000	774.15	801.65	892.87	
35,000	612.92	634.49	706.48	
30,000	479.02	496.09	551.99	
25,000	355.89	369.37	422.85	
24,000		347.44	387.62	427.79
22,000		303.05	339.17	375.30
20,000		221.89	241.39	260.90
18,000		174.98	187.38	199.78
16,000		134.54	141.01	147.48
15,000		119.80	124.65	129.50
12,000		89.06	91.94	94.90
10,000		82.05	87.53	93.02
9,000		80.43	86.10	91.94
8,000		74.32	82.86	91.40
7,000		58.33	65.07	71.90

Table II continued. p ρ/ρ_0

T \ ρ/ρ_0	0.002	0.001	0.0001	0.00001
6,500		41.43	45.12	48.80
6,000		38.64	42.33	46.01
5,500		31.19	33.70	36.22
5,000		25.34	27.14	28.94
4,500		20.64	21.84	23.10
4,000		16.18	16.81	17.44
3,500		12.75	13.00	13.24
3,000		10.30	10.37	10.44
2,500		8.34	8.34	8.34
2,000		6.67	6.67	6.67

Table III Properties of Air along the Hugoniot Curve

Δ S/R	T	p_s/p_o	ρ_s/ρ_o	E/R	H/R	α	γ-1
11.89	7,000	347	11.02	4.8433×10^4	5.7690×10^4	.3495	.19504
17.68	10,000	727	12.03	1.0080×10^5	1.1893×10^5	.8130	.17986
22.07	15,000	1,100	10.7	1.4654×10^5	1.7757×10^5	1.0561	.21046
25.20	20,000	1,600	10.2	2.0768×10^5	2.5283×10^5	1.2574	.21739
28.39	25,000	2,250	9.8	2.6288×10^5	3.2834×10^5	1.6173	.24891
31.21	30,000	3,000	9.5	3.8250×10^5	4.7250×10^5	2.0000	.23529
36.68	40,000	4,500	9.2	5.7156×10^5	7.1096×10^5	2.4851	.24390
41.71	50,000	6,300	9.0	7.9800×10^5	9.9750×10^5	2.9900	.25000
51.56	71,000	11,200	9.0	1.4187×10^6	1.7733×10^6	3.9953	.24999
64.31	101,430	20,000	9.2	2.5410×10^6	3.1607×10^6	5.1101	.24390
77.40	140,000	32,000	9.1	4.0589×10^6	5.0611×10^6	6.1586	.24692
89.73	180,000	47,000	8.5	5.9095×10^6	7.4854×10^6	7.7549	.26667
102.64	246,250	69,000	8.0	8.6034×10^6	1.1062×10^7	8.9822	.28571
112.32	328,300	92,000	7.4	1.1338×10^7	1.4882×10^7	9.7027	.30990
124.33	492,500	128,000	6.4	1.5390×10^7	2.1091×10^7	10.5736	.37037
140.87	712,500	210,000	6.7	2.5459×10^7	3.4391×10^7	11.5373	.35087
158.12	968,750	340,000	7.2	4.1721×10^7	5.5179×10^7	12.8925	.32258

Table IV Thermodynamic Properties of Air at a Pressure of One Bar

ΔS/R	T	ρ ρ_0	E/R	H/R	α	γ-1
11.37	3,400	8.252×10^{-2}	1.5408×10^4	1.9034×10^4	.0692	.23594
12.20	3,600	7.576×10^{-2}	1.7993×10^4	2.1953×10^4	.1000	.22009
13.05	3,800	6.967×10^{-2}	2.0736×10^4	2.5042×10^4	.1331	.20765
13.87	4,000	6.432×10^{-2}	2.3548×10^4	2.8212×10^4	.1661	.19808
14.68	4,200	5.958×10^{-2}	2.6457×10^4	3.1492×10^4	.1988	.19031
15.52	4,400	5.532×10^{-2}	2.9609×10^4	3.5033×10^4	.2326	.18317
16.42	4,600	5.134×10^{-2}	3.2194×10^4	3.9063×10^4	.2704	.18152
17.42	4,800	4.755×10^{-2}	3.7414×10^4	4.3723×10^4	.3144	.16863
18.58	5,000	4.393×10^{-2}	4.2291×10^4	4.9120×10^4	.3659	.16149

Table IV continued.

$\Delta S/R$	T	ρ_s / ρ_o	E/R	H/R	α	γ-1
30.72	7,000	2.223×10^{-2}	9.9388×10^{4}	1.1345×10^{5}	1.023€	.14252
34.10	10,000	1.457×10^{-2}	1.2890×10^{5}	1.4952×10^{5}	1.0502	.15905
52.16	15,000	6.719×10^{-3}	3.2024×10^{5}	3.6581×10^{5}	1.9770	.13944
65.60	20,000	3.837×10^{-3}	5.1539×10^{5}	5.9398×10^{5}	2.8996	.15133
70.73	25,000	2.907×10^{-3}	6.1429×10^{5}	7.1568×10^{5}	3.1274	.16847
86.73	30,000	2.008×10^{-3}	9.7532×10^{5}	1.1374×10^{6}	3.9801	.15318
105.86	40,000	1.246×10^{-3}	1.5127×10^{6}	1.7535×10^{6}	5.0208	.15921
127.097	50,000	8.415×10^{-4}	2.1022×10^{6}	2.4589×10^{6}	6.1323	.16964
175.33	71,000	4.446×10^{-4}	4.8803×10^{6}	5.5551×10^{6}	8.5036	.13826

Table V Properties of air along the adiabatics terminating in the Hugoniot curve.

$\Delta S/R$	ρ / ρ_o	p/p_o	T	E/R	H/R	α
20	.0414	1.000	5,234	4.897×10^{4}	5.665×10^{4}	.4428
	.8074	31.51	7,000	7.461×10^{4}	8.636×10^{4}	.6726
	1.858	86.77	8,000	8.677×10^{4}	1.008×10^{5}	.7512
	3.841	208.9	9,000	9.673×10^{4}	1.130×10^{5}	.8127
	6.6489	409.3	10,000	1.048×10^{5}	1.232×10^{5}	.8469
	11.47	900.	12,024	1.240×10^{5}	1.476×10^{5}	.9577
21	.0396	1.000	5,399	5.364×10^{4}	7.075×10^{4}	.4970
	.6125	24.40	7,000	7.779×10^{4}	8.942×10^{4}	.7074
	1.3916	66.49	8,000	9.021×10^{4}	1.045×10^{5}	.7917
	2.699	149.9	9,000	1.001×10^{5}	1.167×10^{5}	.8515
	4.576	288.03	10,000	1.083×10^{5}	1.272×10^{5}	.8883
	8.527	664.3	12,000	1.237×10^{5}	1.470×10^{5}	.9448
	11.07	993	13,392	1.354×10^{5}	1.631×10^{5}	1.0095
22	.0378	1.00	5,563	5.838×10^{4}	7.443×10^{4}	.5512
	.4542	18.53	7,000	8.088×10^{4}	9.316×10^{4}	.7484
	1.785	101.0	9,000	1.031×10^{5}	1.200×10^{5}	.8864
	3.104	198.5	10,000	1.110×10^{5}	1.302×10^{5}	.9188
	5.103	401.6	12,000	1.259×10^{5}	1.495×10^{5}	.9677
	10.72	1094.	14,920	1.458×10^{5}	1.764×10^{5}	1.0522
23	.0360	1.00	5,727	6.308×10^{4}	7.890×10^{4}	.6054
	.3355	14.01	7,000	8.389×10^{4}	9.642×10^{4}	.7897
	1.230	70.65	9,000	1.055×10^{5}	1.227×10^{5}	.9147
	1.817	117.9	10,000	1.135×10^{5}	1.331×10^{5}	.9470
	3.723	294.8	12,000	1.272×10^{5}	1.510×10^{5}	.9798
	7.935	801.2	15,000	1.488×10^{5}	1.791×10^{5}	1.0193
	10.55	1248.6	16,486	1.643×10^{5}	1.998×10^{5}	1.1159
24	.0342	1.00	5,893	6.778×10^{4}	8.338×10^{4}	.6595
	.2732	11.50	7,000	8.660×10^{4}	9.930×10^{4}	.8040
	1.083	70.98	10,000	1.153×10^{5}	1.349×10^{5}	.9665
	2.253	179.6	12,000	1.287×10^{5}	1.526×10^{5}	.9929
	4.914	500.0	15,000	1.513×10^{5}	1.818×10^{5}	1.0350
	10.39	1408.3	18,083	1.838×10^{5}	2.239×10^{5}	1.1802

Table V continued.

$\Delta S/R$	ρ/ρ_0	p/p_0	T	E/R	H/R	α
25	.0325	1.000	6,058	7.336×10^4	8.785×10^4	.7137
	.2138	9.097	7,000	8.929×10^4	1.022×10^5	.8235
	.7984	53.43	10,000	1.169×10^5	1.370×10^5	1.0008
	1.4513	116.23	12,000	1.291×10^5	1.531×10^5	1.0022
	2.4864	257.4	15,000	1.395×10^5	1.706×10^5	1.0705
	10.23	1568.1	19,680	2.034×10^5	2.480×10^5	1.2445
26	.0307	1.000	6,222	7.718×10^4	9.233×10^4	.7679
	.1545	6.695	7,000	9.198×10^4	1.052×10^5	.8571
	.5711	38.21	10,000	1.189×10^5	1.391×10^5	1.0098
	2.020	209.2	15,000	1.409×10^5	1.722×10^5	1.0717
	5.761	844.9	20,000	2.121×10^5	2.561×10^5	1.2000
	10.10	1763.0	21,253	2.215×10^5	2.718×10^5	1.3477
27	.0288	1.000	6,387	8.189×10^4	9.680×10^4	.8221
	.0999	4.471	7,000	9.450×10^4	1.080×10^5	.9183
	.3240	21.65	10,000	1.211×10^5	1.412×10^5	1.0108
	1.157	121.3	15,000	1.435×10^5	1.752×10^5	1.0973
	3.749	555.4	20,000	2.305×10^5	2.745×10^5	1.2220
	9.974	1966.8	22,821	2.388×10^5	2.954×10^5	1.4605
28	.0271	1.000	6,552	8.660×10^4	1.013×10^5	.8762
	.0741	3.335	7,000	9.592×10^4	1.095×10^5	.9270
	.2154	14.40	10,000	1.221×10^5	1.422×10^5	1.0121
	.7862	83.65	15,000	1.511×10^5	1.832×10^5	1.1280
	2.994	449.2	20,000	2.377×10^5	2.849×10^5	1.2504
	9.849	2170.3	24,389	2.561×10^5	3.191×10^5	1.5733
29	.0253	1.000	6,717	9.130×10^4	1.059×10^5	.9304
	.0484	2.200	7,000	9.734×10^4	1.110×10^5	.9460
	.1313	8.810	10,000	1.228×10^5	1.430×10^5	1.0138
	.5551	59.76	15,000	1.554×10^5	1.878×10^5	1.1531
	2.550	390.8	20,000	2.424×10^5	2.901×10^5	1.2986
	3.794	803.3	25,000	2.693×10^5	3.443×10^5	1.5407
	9.736	2412.2	26,081	2.888×10^5	3.595×10^5	1.7008
30	.0235	1.000	6,881	9.600×10^4	1.101×10^5	.8810
	.0296	1.361	7,000	9.850×10^4	1.123×10^5	.9672
	.0832	5.813	10,000	1.236×10^5	1.438×10^5	1.0182
	.4310	48.80	15,000	1.604×10^5	1.932×10^5	1.2680
	1.8519	298.92	20,000	2.498×10^5	2.983×10^5	1.4211
	3.2337	697.49	25,000	2.840×10^5	3.498×10^5	1.5883
	9.629	2678.2	27,854	3.317×10^5	4.106×10^5	1.8358
35	.01384	1.000	10,249	1.384×10^5	1.603×10^5	1.096
	.1143	12.56	15,000	1.888×10^5	2.238×10^5	1.197
	.5694	94.29	20,000	3.070×10^5	3.612×10^5	1.484
	2.186	478.3	25,000	3.363×10^5	4.084×10^5	1.625
	4.541	1362.4	30,000	4.321×10^5	5.253×10^5	2.000
	9.292	4039.3	36,929	5.135×10^5	6.377×10^5	2.336
40	.01166	1.000	11,633	1.914×10^5	2.202×10^5	1.353
	.04054	5.093	15,000	2.237×10^5	2.613×10^5	1.513

Table V continued.

$\Delta S/R$	ρ/ρ_o	p/p_o	T	E/R	H/R	α
	.2173	41.36	20,000	3.410×10^5	3.989×10^5	1.856
	1.139	281.3	25,000	3.885×10^5	4.671×10^5	1.964
	1.621	536.1	30,000	4.909×10^5	5.947×10^5	2.307
	9.068	5688.	46,600	7.210×10^5	9.001×10^5	2.818
45	.009491	1.000	13,018	2.444×10^5	2.801×10^5	1.610
	.01789	2.430	15,000	2.623×10^5	3.032×10^5	1.716
	.1219	24.30	20,000	3.729×10^5	4.355×10^5	1.991
	.2677	75.13	25,000	4.398×10^5	5.245×10^5	2.368
	.7535	270.0	30,000	5.316×10^5	6.420×10^5	2.583
	5.023	3333.1	50,000	8.502×10^5	1.054×10^6	2.982
	9.000	7936.7	57,014	1.005×10^6	1.256×10^6	3.326
50	.007318	1.000	14,402	2.974×10^5	3.399×10^5	1.866
	.009239	1.335	15,000	3.028×10^5	3.468×10^5	1.889
	.05064	11.42	20,000	4.089×10^5	4.720×10^5	2.383
	.1216	36.63	25,000	4.865×10^5	5.769×10^5	2.614
	.2896	110.98	30,000	5.782×10^5	6.895×10^5	2.832
	.6661	362.81	40,000	7.168×10^5	8.815×10^5	3.085
	2.393	1637.5	50,000	9.389×10^5	1.155×10^6	3.106
	9.000	10424.	67,674	1.320×10^6	1.650×10^6	3.836
55	.006112	1.000	16,057	3.616×10^5	4.140×10^5	2.172
	.02423	5.765	20,000	4.510×10^5	5.226×10^5	2.568
	.05696	17.82	25,000	5.237×10^5	6.186×10^5	2.754
	.09942	39.64	30,000	6.022×10^5	7.219×10^5	2.988
	.34612	195.6	40,000	7.861×10^5	9.581×10^5	3.238
	.6998	559.5	50,000	1.104×10^6	1.345×10^6	3.797
	5.730	6780.7	71,000	1.495×10^6	1.860×10^6	4.146
	9.054	13574.	79,210	1.722×10^6	2.148×10^6	4.296
60	.005043	1.000	17,917	4.341×10^5	4.989×10^5	2.515
	.01080	2.706	20,000	4.873×10^5	5.625×10^5	2.759
	.02124	6.948	25,000	5.525×10^5	6.507×10^5	2.925
	.04709	19.16	30,000	6.405×10^5	7.637×10^5	3.069
	.1647	98.44	40,000	8.605×10^5	1.040×10^6	3.489
	.5143	386.99	50,000	1.172×10^6	1.419×10^6	3.950
	3.259	3863.5	71,000	1.636×10^6	2.022×10^6	4.427
	9.132	17025.	91,143	2.112×10^6	2.692×10^6	4.733
65	.003975	1.0000	19,777	5.067×10^5	5.838×10^5	2.858
	.004316	1.1198	20,000	5.128×10^5	5.906×10^5	2.891
	.008044	2.691	25,000	5.773×10^5	6.778×10^5	3.014
	.01977	8.352	30,000	6.888×10^5	8.158×10^5	3.225
	.1040	64.207	40,000	9.448×10^5	1.133×10^6	3.695
	.3123	238.8	50,000	1.242×10^6	1.499×10^6	4.141
	1.784	2145.9	71,000	1.785×10^6	2.189×10^6	4.695
	9.195	20633.	103,463	2.621×10^6	3.261×10^6	5.165
70	.003030	1.000	24,349	5.999×10^5	6.998×10^5	3.098
	.003243	1.111	25,000	6.082×10^5	7.039×10^5	3.109
	.01030	4.516	30,000	7.488×10^5	8.805×10^5	3.385

Table V continued.

$\Delta S/R$	ρ/ρ_0	p/p_0	T	E/R	H/R	α
	.06202	40.08	40,000	1.030×10^6	1.266×10^6	3.902
	.1385	149.8	50,000	1.319×10^6	1.592×10^6	4.450
	.9689	1236.4	71,000	1.962×10^6	2.383×10^6	4.926
	5.266	11721.	101,430	2.741×10^6	3.409×10^6	5.255
	9.157	25216.	118,196	3.201×10^6	3.987×10^6	5.566
75	.002667	1.000	26,334	7.093×10^5	8.282×10^5	3.355
	.006446	2.912	30,000	8.177×10^5	9.546×10^5	3.517
	.04105	27.31	40,000	1.116×10^6	1.320×10^6	4.108
	.1023	95.58	50,000	1.380×10^6	1.612×10^6	4.624
	.4579	648.7	71,000	2.104×10^6	2.541×10^6	5.162
	3.707	8412.1	101,430	2.939×10^6	3.632×10^6	5.376
	9.118	29800.	132,928	3.781×10^6	4.713×10^6	5.966
80	.002386	1.000	27,897	8.227×10^5	9.600×10^5	3.621
	.003642	1.725	30,000	8.885×10^5	1.031×10^6	3.741
	.02271	16.02	40,000	1.200×10^6	1.413×10^6	4.311
	.06142	58.84	50,000	1.436×10^6	1.725×10^6	4.776
	.3505	484.6	71,000	2.205×10^6	2.663×10^6	5.446
	2.149	5103.5	101,430	3.137×10^6	3.854×10^6	5.672
	7.282	26457.	140,000	4.214×10^6	5.305×10^6	6.396
	8.974	35163.	148,435	4.449×10^6	5.572×10^6	6.495
85	.002105	1.000	29,459	9.361×10^5	1.092×10^6	3.888
	.002320	1.142	30,000	9.614×10^5	1.109×10^6	3.919
	.01441	10.43	40,000	1.277×10^6	1.497×10^6	4.495
	.03767	37.09	50,000	1.487×10^6	1.782×10^6	4.905
	.2236	334.8	71,000	2.247×10^6	2.711×10^6	5.538
	1.640	3942.4	101,430	3.319×10^6	3.474×10^6	5.757
	4.884	18297.	140,000	4.438×10^6	5.565×10^6	6.627
	8.730	41246.	164,655	5.200×10^6	6.556×10^6	7.142
90	.001878	1.000	31,709	1.067×10^6	1.243×10^6	4.158
	.008558	6.415	40,000	1.346×10^6	1.573×10^6	4.657
	.01904	19.83	50,000	1.537×10^6	1.838×10^6	5.026
	.1821	246.7	71,000	2.345×10^6	2.820×10^6	5.688
	1.130	2781.3	101,430	3.502×10^6	4.270×10^6	5.917
	3.335	12861.	140,000	4.743×10^6	5.904×10^6	7.289
	8.489	47460.	181,385	5.966×10^6	7.560×10^6	7.781
95	.001678	1.000	34,323	1.208×10^6	1.404×10^6	4.430
	.004772	3.682	40,000	1.407×10^6	1.639×10^6	4.799
	.01293	14.72	50,000	1.576×10^6	1.882×10^6	5.109
	.07389	119.4	71,000	2.553×10^6	3.046×10^6	5.967
	.7440	1878.	101,430	3.680×10^6	4.474×10^6	6.466
	2.315	9166.	140,000	5.007×10^6	6.199×10^6	7.512
	5.437	29792.	180,000	6.214×10^6	7.866×10^6	8.179
	8.296	55981.	207,044	7.009×10^6	8.945×10^6	8.256
100	.001479	1.000	36,937	1.348×10^6	1.565×10^6	4.702
	.002549	2.009	40,000	1.459×10^6	1.695×10^6	4.913
	.006988	9.618	50,000	1.619×10^6	1.929×10^6	5.198

Table V continued.

S/R	ρ/ρ_0	p/p_0	T	E/R	H/R	α
	.05280	87.39	71,000	2.728×10^6	3.232×10^6	6.107
	.3581	974.7	101,430	3.860×10^6	4.678×10^6	7.050
	1.651	6727.4	140,000	5.293×10^6	6.527×10^6	7.808
	3.836	21679.	180,000	6.551×10^6	8.248×10^6	8.430
	8.102	64501.	232,702	8.053×10^6	1.033×10^7	8.731
105	.001280	1.000	39,550	1.489×10^6	1.726×10^6	4.974
	.001384	1.109	40,000	1.505×10^6	1.745×10^6	5.006
	.004455	4.762	50,000	1.729×10^6	2.050×10^6	5.416
	.03569	61.13	71,000	2.899×10^6	3.416×10^6	6.279
	.2828	783.0	101,430	4.053×10^6	4.898×10^6	7.190
	1.308	5420.1	140,000	5.599×10^6	6.883×10^6	8.169
	2.845	16395.	180,000	6.871×10^6	8.614×10^6	8.688
	6.817	58299.	246,250	8.761×10^6	1.133×10^7	8.897
	7.854	74607.	266,254	9.270×10^6	1.199×10^7	9.180
110	.001167	1.000	41,949	1.628×10^6	1.891×10^6	5.238
	.002922	3.198	50,000	1.809×10^6	2.137×10^6	5.568
	.02720	47.33	71,000	3.059×10^6	3.591×10^6	6.488
	.2074	591.2	101,430	4.247×10^6	5.118×10^6	7.596
	.9654	4112.7	140,000	5.906×10^6	7.240×10^6	8.529
	1.928	11479.	180,000	7.188×10^6	8.978×10^6	8.947
	4.837	42325.	246,250	9.112×10^6	1.204×10^7	9.127
	7.544	86488.	308,635	1.068×10^7	1.397×10^7	9.598
115	.001072	1.000	44,304	1.766×10^6	2.057×10^6	5.499
	.002000	2.242	50,000	1.893×10^6	2.229×10^6	5.729
	.01872	33.53	71,000	3.219×10^6	3.766×10^6	6.698
	.1505	439.7	101,430	4.478×10^6	5.381×10^6	7.906
	.7598	3328.3	140,000	6.089×10^6	7.454×10^6	8.746
	1.291	8051.8	180,000	7.417×10^6	9.343×10^6	9.704
	3.385	30458.	246,250	9.445×10^6	1.213×10^7	9.891
	6.030	75880.	328,300	1.146×10^7	1.523×10^7	9.924
	7.177	100030.	364,941	1.224×10^7	1.627×10^7	9.967
120	.000977	1.000	46,658	1.905×10^6	2.223×10^6	5.761
	.001380	1.586	50,000	1.979×10^6	2.324×10^6	5.895
	.01264	23.492	71,000	3.370×10^6	3.931×10^6	6.888
	.09353	288.17	101,430	4.710×10^6	5.645×10^6	8.215
	.4109	2085.2	140,000	6.483×10^6	7.906×10^6	9.166
	.8252	5483.	180,000	7.685×10^6	9.706×10^6	9.803
	2.204	21970.	246,250	9.769×10^6	1.249×10^7	10.029
	4.184	53543.	328,300	1.174×10^7	1.557×10^7	10.111
	6.761	115020.	433,301	1.393×10^7	1.885×10^7	10.292
125	.000881	1.000	49,013	2.044×10^6	2.389×10^6	6.023
	.000968	1.139	50,000	2.066×10^6	2.419×10^6	6.073
	.009964	18.79	71,000	3.508×10^6	4.080×10^6	7.051
	.07240	225.6	101,430	4.894×10^6	5.839×10^6	8.325
	.2732	1698.3	140,000	6.734×10^6	8.190×10^6	9.394
	.6440	4322.9	180,000	8.058×10^6	1.006×10^7	9.628

Table V continued.

ΔS/R	ρ/ρ_o	p/p_o	T	E/R	H/R	α
	1.684	15688.	246,250	1.001×10^7	1.281×10^7	9.782
	2.966	38580.	328,300	1.198×10^7	1.584×10^7	10.294
	6.184	123950.	492,500	1.534×10^7	2.130×10^7	10.600
	6.412	131320.	501,412	1.580×10^7	2.163×10^7	10.613
130	.000818	1.000	52,264	2.269×10^6	2.645×10^6	6.275
	.007290	14.086	71,000	3.646×10^6	4.229×10^6	7.213
	.05127	163.07	101,430	5.077×10^6	6.033×10^6	8.434
	.2552	1256.3	140,000	6.975×10^6	8.261×10^6	9.547
	.4628	3162.7	180,000	8.430×10^6	1.042×10^7	9.820
	1.249	11900.	246,250	1.031×10^7	1.316×10^7	10.025
	1.947	25911.	328,300	1.218×10^7	1.609×10^7	10.552
	4.295	86914.	492,500	1.567×10^7	2.167×10^7	10.809
	6.503	156110.	567,917	1.884×10^7	2.565×10^7	10.904
135	.000776	1.000	53,441	2.557×10^6	2.966×10^6	6.521
	.005514	1.087	71,000	3.792×10^6	4.387×10^6	7.376
	.04338	139.13	101,430	5.154×10^6	6.124×10^6	8.561
	.1837	916.77	140,000	7.298×10^6	8.807×10^6	9.778
	.3608	2433.8	180,000	8.632×10^6	1.064×10^7	10.143
	.8144	8112.7	246,250	1.061×10^7	1.351×10^7	10.529
	1.5463	20744.	328,300	1.231×10^7	1.625×10^7	10.646
	3.0599	63018.	492,500	1.597×10^7	2.201×10^7	10.918
	6.594	180900.	634,423	2.189×10^7	2.967×10^7	11.195

Table VI Thermodynamic properties of air

T	ΔS/R	ρ/ρ_o	p/p_o	E/R	H/R
7,000	11	1.911x10	5.759×10^2	4.570×10^4	5.263×10^4
	12	1.413x10	4.860×10^2	4.613×10^4	5.528×10^4
	13	8.243	2.598×10^2	5.145×10^4	5.988×10^4
	14	5.406	1.765×10^2	5.677×10^4	6.374×10^4
	15	4.031	1.344×10^2	5.745×10^4	6.759×10^4
	16	2.899	9.925x10	6.099×10^4	7.144×10^4
	17	1.908	6.821x10	6.455×10^4	7.531×10^4
	18	1.457	5.319x10	6.817×10^4	7.924×10^4
	19	1.007	3.816x10	7.180×10^4	8.317×10^4
	20	8.074×10^{-1}	3.151x10	7.461×10^4	8.636×10^4
	21	6.125×10^{-1}	2.440x10	7.779×10^4	8.942×10^4
	22	4.542×10^{-1}	1.853x10	8.088×10^4	9.316×10^4
	23	3.355×10^{-1}	1.401x10	8.389×10^4	9.642×10^4
	24	2.732×10^{-1}	1.150x10	8.660×10^4	9.930×10^4
	25	2.138×10^{-1}	9.097	8.929×10^4	1.022×10^5
	26	1.545×10^{-1}	6.695	9.198×10^4	1.051×10^5
	27	9.989×10^{-2}	4.471	9.450×10^4	1.079×10^5
	28	7.417×10^{-2}	3.335	9.592×10^4	1.095×10^5
	29	4.845×10^{-2}	2.200	9.734×10^4	1.110×10^5

Table VI continued.

T	ΔS/R	ρ/ρ_o	p/p_o	E/R	H/R
	30	2.965×10^{-2}	1.361	9.850×10^{4}	1.123×10^{5}
10,000	17	1.773x10	1.024×10^{3}	9.485×10^{4}	1.122×10^{5}
	18	1.275x10	7.565×10^{2}	9.924×10^{4}	1.170×10^{5}
	19	8.965	5.422×10^{2}	1.024×10^{5}	1.206×10^{5}
	20	6.649	4.093×10^{2}	1.048×10^{5}	1.232×10^{5}
	21	4.576	2.880×10^{2}	1.083×10^{5}	1.272×10^{5}
	22	3.104	1.985×10^{2}	1.110×10^{5}	1.302×10^{5}
	23	1.817	1.179×10^{2}	1.135×10^{5}	1.330×10^{5}
	24	1.083	7.098x10	1.153×10^{5}	1.350×10^{5}
	25	7.984×10^{-1}	5.343x10	1.169×10^{5}	1.370×10^{5}
	26	5.711×10^{-1}	3.821x10	1.189×10^{5}	1.391×10^{5}
	27	3.240×10^{-1}	2.165x10	1.211×10^{5}	1.413×10^{5}
	28	2.154×10^{-1}	1.440x10	1.221×10^{5}	1.422×10^{5}
	29	1.313×10^{-1}	8.809	1.228×10^{5}	1.430×10^{5}
	30	8.319×10^{-2}	5.813	1.236×10^{5}	1.438×10^{5}
	31	5.163×10^{-2}	3.484	1.247×10^{5}	1.449×10^{5}
	32	3.467×10^{-2}	2.346	1.258×10^{5}	1.461×10^{5}
	33	2.327×10^{-2}	1.580	1.273×10^{5}	1.477×10^{5}
	34	1.468×10^{-2}	1.002	1.288	1.493×10^{5}
15,000	21	1.127x10	1.139×10^{3}	1.308×10^{5}	1.613×10^{5}
	22	1.032x10	1.042×10^{3}	1.308×10^{5}	1.614×10^{5}
	23	5.025	5.137×10^{2}	1.347×10^{5}	1.654×10^{5}
	24	4.522	4.618×10^{2}	1.358×10^{5}	1.666×10^{5}
	25	2.486	2.574×10^{2}	1.395×10^{5}	1.706×10^{5}
	26	2.020	2.092×10^{2}	1.409×10^{5}	1.722×10^{5}
	27	1.157	1.213×10^{2}	1.435×10^{5}	1.752×10^{5}
	28	7.862×10^{-1}	8.365x10	1.511×10^{5}	1.832×10^{5}
	29	5.551×10^{-1}	5.976x10	1.553×10^{5}	1.878×10^{5}
	30	4.310×10^{-1}	4.680x10	1.604×10^{5}	1.932×10^{5}
	31	3.595×10^{-1}	3.921x10	1.659×10^{5}	1.991×10^{5}
	32	2.880×10^{-1}	3.162x10	1.714×10^{5}	2.051×10^{5}
	33	2.165×10^{-1}	2.403x10	1.769×10^{5}	2.110×10^{5}
	34	1.450×10^{-1}	1.644x10	1.824×10^{5}	2.169×10^{5}
	35	1.143×10^{-1}	1.327x10	1.888×10^{5}	2.238×10^{5}
	36	9.446×10^{-2}	1.109x10	1.955×10^{5}	2.310×10^{5}
	37	7.462×10^{-2}	8.916	2.022×10^{5}	2.383×10^{5}
	38	5.883×10^{-2}	7.170	2.091×10^{5}	2.457×10^{5}
	39	4.968×10^{-2}	6.131	2.164×10^{5}	2.536×10^{5}
	40	4.053×10^{-2}	5.093	2.237×10^{5}	2.615×10^{5}
	41	3.438×10^{-2}	4.404	2.313×10^{5}	2.697×10^{5}
	42	3.014×10^{-2}	3.880	2.390×10^{5}	2.780×10^{5}
	43	2.569×10^{-2}	3.356	2.467×10^{5}	2.863×10^{5}
	44	2.125×10^{-2}	2.832	2.544×10^{5}	2.947×10^{5}
	45	1.789×10^{-2}	2.430	2.623×10^{5}	3.032×10^{5}
	46	1.567×10^{-2}	2.155	2.704×10^{5}	3.119×10^{5}
	47	1.346×10^{-2}	1.880	2.784×10^{5}	3.205×10^{5}

Table VI continued.

T	ΔS/R	ρ/ρ_o	p/p_o	E/R	H/R
	48	1.157×10^{-2}	1.644	2.865×10^{5}	3.293×10^{5}
	49	1.041×10^{-2}	1.490	2.946×10^{5}	3.380×10^{5}
	50	9.239×10^{-3}	1.335	3.028×10^{5}	3.468×10^{5}
	51	8.072×10^{-3}	1.180	3.109×10^{5}	3.557×10^{5}
	52	6.905×10^{-3}	1.025	3.190×10^{5}	3.644×10^{5}
20,000	24	1.140x10	1.611×10^{3}	1.975×10^{5}	2.277×10^{5}
	25	7.603	1.085×10^{3}	2.065×10^{5}	2.491×10^{5}
	26	5.761	8.449×10^{2}	2.121×10^{5}	2.561×10^{5}
	27	3.749	5.554×10^{2}	2.305×10^{5}	2.745×10^{5}
	28	2.994	4.492×10^{2}	2.377×10^{5}	2.849×10^{5}
	29	2.550	3.908×10^{2}	2.424×10^{5}	2.901×10^{5}
	30	1.852	2.989×10^{2}	2.498×10^{5}	2.983×10^{5}
	31	1.327	2.161×10^{2}	2.635×10^{5}	3.124×10^{5}
	32	1.017	1.668×10^{2}	2.755×10^{5}	3.254×10^{5}
	33	8.650×10^{-1}	1.426×10^{2}	2.860×10^{5}	3.374×10^{5}
	34	7.127×10^{-1}	1.184×10^{2}	2.965×10^{5}	3.493×10^{5}
	35	5.694×10^{-1}	9.429x10	3.070×10^{5}	3.612×10^{5}
	36	4.081×10^{-1}	6.961x10	3.176×10^{5}	3.732×10^{5}
	37	3.314×10^{-1}	5.849x10	3.244×10^{5}	3.803×10^{5}
	38	2.825×10^{-1}	5.147x10	3.300×10^{5}	3.855×10^{5}
	39	2.363×10^{-1}	4.477x10	3.346×10^{5}	3.915×10^{5}
	40	2.173×10^{-1}	4.136x10	3.410×10^{5}	3.989×10^{5}
	41	1.982×10^{-1}	3.795x10	3.474×10^{5}	4.062×10^{5}
	42	1.791×10^{-1}	3.454x10	3.538×10^{5}	4.135×10^{5}
	43	1.600×10^{-1}	3.112x10	3.601×10^{5}	4.209×10^{5}
	44	1.410×10^{-1}	2.771x10	3.665×10^{5}	4.282×10^{5}
	45	1.219×10^{-1}	2.430x10	3.729×10^{5}	4.355×10^{5}
	46	1.028×10^{-1}	2.089x10	3.793×10^{5}	4.429×10^{5}
	47	8.372×10^{-2}	1.748x10	3.857×10^{5}	4.502×10^{5}
	48	6.465×10^{-2}	1.406x10	3.920×10^{5}	4.576×10^{5}
	49	5.690×10^{-2}	1.261x10	4.003×10^{5}	4.626×10^{5}
	50	5.064×10^{-2}	1.142x10	4.089×10^{5}	4.720×10^{5}
	51	4.439×10^{-2}	1.023x10	4.174×10^{5}	4.814×10^{5}
	52	3.814×10^{-2}	9.045	4.260×10^{5}	4.909×10^{5}
	53	3.188×10^{-2}	7.857	4.345×10^{5}	5.003×10^{5}
	54	2.563×10^{-2}	6.669	4.431×10^{5}	5.097×10^{5}
	55	2.423×10^{-2}	5.765	4.510×10^{5}	5.226×10^{5}
	56	2.145×10^{-2}	5.134	4.584×10^{5}	5.307×10^{5}
	57	1.867×10^{-2}	4.503	4.658×10^{5}	5.388×10^{5}
	58	1.589×10^{-2}	3.872	4.731×10^{5}	5.470×10^{5}
	59	1.311×10^{-2}	3.241	4.805×10^{5}	5.508×10^{5}
	60	1.080×10^{-2}	2.706	4.873×10^{5}	5.625×10^{5}
	61	9.206×10^{-3}	2.322	4.930×10^{5}	5.689×10^{5}
	62	7.614×10^{-3}	1.938	4.988×10^{5}	5.752×10^{5}
	63	6.370×10^{-3}	1.632	5.038×10^{5}	5.808×10^{5}
	64	5.241×10^{-3}	1.352	5.086×10^{5}	5.860×10^{5}

Table VI continued.

T	ΔS/R	ρ/ρ_0	p/p_0	E/R	H/R
	65	4.316×10^{-3}	1.120	5.128×10^{5}	5.906×10^{5}
	66	3.533×10^{-3}	.921	5.165×10^{5}	5.962×10^{5}
25,000	25	8.838	1.755×10^{3}	2.367×10^{5}	2.953×10^{5}
	30	3.234	6.975×10^{2}	2.840×10^{5}	3.498×10^{5}
	35	2.186	4.783×10^{2}	3.363×10^{5}	4.084×10^{5}
	40	1.139	2.813×10^{2}	3.885×10^{5}	4.671×10^{5}
	45	2.677×10^{-1}	7.513×10	4.398×10^{5}	5.246×10^{5}
	50	1.216×10^{-1}	3.663×10	4.865×10^{5}	5.769×10^{5}
	55	5.696×10^{-2}	1.782×10	5.237×10^{5}	6.186×10^{5}
	60	2.124×10^{-2}	6.948	5.525×10^{5}	6.507×10^{5}
	65	8.044×10^{-3}	2.691	5.773×10^{5}	6.778×10^{5}
	70	3.240×10^{-3}	1.111	6.082×10^{5}	7.038×10^{5}
30,000	30	6.283	1.885×10^{3}	4.114×10^{5}	5.005×10^{5}
	35	4.541	1.362×10^{3}	4.321×10^{5}	5.253×10^{5}
	40	1.621	5.361×10^{2}	4.909×10^{5}	5.947×10^{5}
	45	7.535×10^{-1}	2.700×10^{2}	5.316×10^{5}	6.420×10^{5}
	50	2.897×10^{-1}	1.110×10^{2}	5.782×10^{5}	6.895×10^{5}
	55	9.942×10^{-2}	3.964×10	6.022×10^{5}	7.219×10^{5}
	60	4.709×10^{-2}	1.916×10	6.406×10^{5}	7.637×10^{5}
	65	1.977×10^{-2}	8.352	6.888×10^{5}	8.158×10^{5}
	70	1.030×10^{-2}	4.516	7.488×10^{5}	8.805×10^{5}
	75	6.446×10^{-3}	2.912	8.177×10^{5}	9.546×10^{5}
	80	3.642×10^{-3}	1.726	8.885×10^{5}	1.031×10^{6}
	85	2.320×10^{-3}	1.142	9.614×10^{5}	1.109×10^{6}
	90	1.501×10^{-3}	7.647×10^{-1}	1.035×10^{6}	1.189×10^{6}
40,000	50	6.661×10^{-1}	3.628×10^{2}	7.168×10^{5}	8.815×10^{5}
	55	3.461×10^{-1}	1.956×10^{2}	7.861×10^{5}	9.581×10^{5}
	60	1.648×10^{-1}	9.844×10	8.605×10^{5}	1.040×10^{6}
	65	1.040×10^{-1}	6.421×10	9.448×10^{5}	1.133×10^{6}
	70	6.202×10^{-2}	4.009×10	1.030×10^{6}	1.226×10^{6}
	75	4.105×10^{-2}	2.731×10	1.116×10^{6}	1.320×10^{6}
	80	2.271×10^{-2}	1.602×10	1.200×10^{6}	1.413×10^{6}
	85	1.441×10^{-2}	1.043×10	1.277×10^{6}	1.497×10^{6}
	90	8.558×10^{-3}	6.415	1.346×10^{6}	1.573×10^{6}
	95	4.772×10^{-3}	3.682	1.407×10^{6}	1.639×10^{6}
	100	2.549×10^{-3}	2.009	1.459×10^{6}	1.695×10^{6}
	105	1.385×10^{-3}	1.109	1.505×10^{6}	1.745×10^{6}
50,000	45	5.023	3.333×10^{3}	8.501×10^{5}	1.054×10^{6}
	50	2.393	1.638×10^{3}	9.389×10^{5}	1.155×10^{6}
	55	6.998×10^{-1}	5.595×10^{2}	1.104×10^{6}	1.345×10^{6}
	60	5.143×10^{-1}	3.870×10^{2}	1.172×10^{6}	1.419×10^{6}
	65	3.123×10^{-1}	2.388×10^{2}	1.242×10^{6}	1.499×10^{6}
	70	1.385×10^{-1}	1.498×10^{2}	1.319×10^{6}	1.592×10^{6}
	75	1.023×10^{-1}	9.558×10	1.380×10^{6}	1.662×10^{6}
	80	6.142×10^{-2}	5.884×10	1.436×10^{6}	1.725×10^{6}
	85	3.767×10^{-2}	3.709×10	1.487×10^{6}	1.782×10^{6}

Table VI continued.

T	ΔS/R	ρ/ρ_0	p/p_0	E/R	H/R
	90	1.904×10^{-2}	1.983×10	1.537×10^{6}	1.838×10^{6}
	95	1.293×10^{-2}	1.472×10	1.576×10^{6}	1.882×10^{6}
	100	6.988×10^{-3}	9.618	1.619×10^{6}	1.929×10^{6}
	105	4.455×10^{-3}	4.762	1.729×10^{6}	2.050×10^{6}
	110	2.922×10^{-3}	3.198	1.809×10^{6}	2.137×10^{6}
	115	2.000×10^{-3}	2.242	1.893×10^{6}	2.229×10^{6}
	120	1.380×10^{-3}	1.586	1.979×10^{6}	2.324×10^{6}
	125	9.677×10^{-4}	1.139	2.066×10^{6}	2.419×10^{6}
71,000	55	5.730	6.781×10^{3}	1.495×10^{6}	1.860×10^{6}
	60	3.259	3.864×10^{3}	1.636×10^{6}	2.022×10^{6}
	65	1.784	2.146×10^{3}	1.785×10^{6}	2.189×10^{6}
	70	9.689×10^{-1}	1.236×10^{3}	1.962×10^{6}	2.383×10^{6}
	75	4.579×10^{-1}	6.487×10^{2}	2.104×10^{6}	2.541×10^{6}
	80	3.505×10^{-1}	4.846×10^{2}	2.205×10^{6}	2.663×10^{6}
	85	2.236×10^{-1}	3.348×10^{2}	2.247×10^{6}	2.711×10^{6}
	90	1.621×10^{-1}	2.467×10^{2}	2.345×10^{6}	2.820×10^{6}
	95	7.389×10^{-2}	1.194×10^{2}	2.553×10^{6}	3.046×10^{6}
	100	5.280×10^{-2}	8.740×10	2.728×10^{6}	3.233×10^{6}
	105	3.569×10^{-2}	6.113×10	2.899×10^{6}	3.416×10^{6}
	110	2.720×10^{-2}	4.733×10	3.059×10^{6}	3.591×10^{6}
	115	1.872×10^{-2}	3.353×10	3.219×10^{6}	3.766×10^{6}
	120	1.264×10^{-2}	2.349×10	3.370×10^{6}	3.930×10^{6}
	125	9.964×10^{-3}	1.879×10	3.508×10^{6}	4.080×10^{6}
	130	7.290×10^{-3}	1.409×10	3.646×10^{6}	4.229×10^{6}
	135	5.514×10^{-3}	1.087×10	3.792×10^{6}	4.387×10^{6}
	140	4.199×10^{-3}	8.409	3.942×10^{6}	4.548×10^{6}
	145	2.940×10^{-3}	6.050	4.089×10^{6}	4.709×10^{6}
	150	2.315×10^{-3}	4.815	4.231×10^{6}	4.861×10^{6}
	155	1.691×10^{-3}	3.580	4.373×10^{6}	5.014×10^{6}
	160	1.217×10^{-3}	2.626	4.511×10^{6}	5.160×10^{6}
	165	8.823×10^{-4}	1.933	4.640×10^{6}	5.298×10^{6}
	170	6.514×10^{-4}	1.445	4.759×10^{6}	5.425×10^{6}
	175	4.552×10^{-4}	1.023	4.873×10^{6}	5.547×10^{6}
101,403	70	5.266	1.172×10^{4}	2.741×10^{6}	3.409×10^{6}
	80	2.149	5.104×10^{3}	3.137×10^{6}	3.854×10^{6}
	90	1.130	2.781×10^{3}	3.502×10^{6}	4.270×10^{6}
	100	3.581×10^{-1}	9.747×10^{2}	3.860×10^{6}	4.678×10^{6}
	110	2.074×10^{-1}	5.912×10^{2}	4.247×10^{6}	5.118×10^{6}
	120	9.353×10^{-2}	2.882×10^{2}	4.710×10^{6}	5.645×10^{6}
	130	5.127×10^{-2}	1.631×10^{2}	5.077×10^{6}	6.033×10^{6}
	140	3.549×10^{-2}	1.152×10^{2}	5.232×10^{6}	6.214×10^{6}
	150	2.059×10^{-2}	6.897×10	5.585×10^{6}	6.596×10^{6}
	160	8.667×10^{-3}	3.023×10	6.269×10^{6}	7.342×10^{6}
	170	4.312×10^{-3}	1.583×10	6.786×10^{6}	7.888×10^{6}
	180	3.234×10^{-3}	1.202×10	7.026×10^{6}	8.148×10^{6}
	190	2.156×10^{-3}	8.201	7.267×10^{6}	8.408×10^{6}

Table VI continued.

T	ΔS/R	ρ / ρ_o	p/p_o	E/R	H/R
	200	1.363×10^{-3}	5.186	7.547×10^{6}	8.710×10^{6}
	210	7.499×10^{-4}	2.964	7.837×10^{6}	9.023×10^{6}
	220	4.352×10^{-4}	1.104	8.043×10^{6}	9.243×10^{6}
140,000	80	7.282	2.646×10^{4}	4.214×10^{6}	5.305×10^{6}
	85	4.884	1.830×10^{4}	4.438×10^{6}	5.564×10^{6}
	90	3.335	1.286×10^{4}	4.743×10^{6}	5.904×10^{6}
	95	2.315	9.166×10^{3}	5.007×10^{6}	6.199×10^{6}
	100	1.651	6.727×10^{3}	5.293×10^{6}	6.526×10^{6}
	105	1.308	5.420×10^{3}	5.600×10^{6}	6.883×10^{6}
	110	9.654×10^{-1}	4.113×10^{3}	5.906×10^{6}	7.240×10^{6}
	115	7.598×10^{-1}	3.328×10^{3}	6.089×10^{6}	7.454×10^{6}
	120	4.109×10^{-1}	2.085×10^{3}	6.483×10^{6}	7.906×10^{6}
	125	2.732×10^{-1}	1.698×10^{3}	6.734×10^{6}	8.189×10^{6}
	130	2.553×10^{-1}	1.256×10^{3}	6.975×10^{6}	8.261×10^{6}
	135	1.837×10^{-1}	9.168×10^{2}	7.298×10^{6}	8.807×10^{6}
	140	1.210×10^{-1}	6.179×10^{2}	7.585×10^{6}	9.192×10^{6}
	145	9.706×10^{-2}	5.039×10^{2}	7.836×10^{6}	9.401×10^{6}
	150	8.150×10^{-2}	4.256×10^{2}	7.995×10^{6}	9.576×10^{6}
	155	6.594×10^{-2}	3.474×10^{2}	8.154×10^{6}	9.751×10^{6}
	160	5.037×10^{-2}	2.691×10^{2}	8.312×10^{6}	9.926×10^{6}
	165	3.747×10^{-2}	2.031×10^{2}	8.472×10^{6}	1.010×10^{7}
	170	2.852×10^{-2}	1.557×10^{2}	8.623×10^{6}	1.027×10^{7}
	175	1.967×10^{-2}	1.088×10^{2}	8.776×10^{6}	1.043×10^{7}
	180	1.467×10^{-2}	8.154x10	8.901×10^{6}	1.057×10^{7}
	185	1.005×10^{-2}	5.863x10	9.020×10^{6}	1.070×10^{7}
180,000	95	5.437	2.994×10^{4}	6.214×10^{6}	7.866×10^{6}
	100	3.836	2.168×10^{4}	6.551×10^{6}	8.248×10^{6}
	105	2.845	1.640×10^{4}	6.871×10^{6}	8.614×10^{6}
	110	1.928	1.148×10^{4}	7.188×10^{6}	8.978×10^{6}
	115	1.291	8.052×10^{3}	7.417×10^{6}	9.343×10^{6}
	120	8.252×10^{-1}	5.483×10^{3}	7.685×10^{6}	9.706×10^{6}
	125	6.440×10^{-1}	4.323×10^{3}	8.058×10^{6}	1.007×10^{7}
	130	4.628×10^{-1}	3.163×10^{3}	8.430×10^{6}	1.042×10^{7}
	135	3.608×10^{-1}	2.436×10^{3}	8.633×10^{6}	1.064×10^{7}
	140	2.764×10^{-1}	1.947×10^{3}	8.860×10^{6}	1.094×10^{7}
	145	1.979×10^{-1}	1.410×10^{3}	9.018×10^{6}	1.111×10^{7}
	150	1.503×10^{-1}	1.077×10^{3}	9.165×10^{6}	1.130×10^{7}
	155	1.027×10^{-1}	7.432×10^{2}	9.311×10^{6}	1.148×10^{7}
	160	7.850×10^{-2}	5.699×10^{2}	9.422×10^{6}	1.161×10^{7}
	165	5.609×10^{-2}	4.091×10^{2}	9.529×10^{6}	1.172×10^{7}
	170	3.700×10^{-2}	2.684×10^{2}	9.628×10^{6}	1.183×10^{7}
	175	2.647×10^{-2}	1.916×10^{2}	9.701×10^{6}	1.191×10^{7}
	180	1.725×10^{-2}	1.276×10^{2}	9.764×10^{6}	1.198×10^{7}

Table VII

$\Delta S/R$	ρ/ρ_0	$\gamma-1$	$\Delta S/R$	ρ/ρ_0	$\gamma-1$
20	.0414	.15421	27	.0288	.14212
	.8074	.15693		.0999	.14210
	1.858	.16146		.3240	.16604
	3.841	.16866		1.157	.21923
	6.6489	.17623		3.749	.19280
	11.47	.18983		9.974	.23514
21	.0396	.15068	28	.0271	.14195
	.6125	.15364		.0741	.14063
	1.3916	.15889		.2154	.16479
	2.699	.16647		.7862	.21125
	4.576	.17436		2.994	.18935
	8.527	.18866		9.849	.24506
	11.07	.19864			
			29	.0253	.14202
22	.0378	.14781		.0484	.13994
	.4542	.15132		.1313	.16399
	1.785	.16467		.5551	.20783
	3.104	.17286		2.550	.18965
	5.103	.18755		3.794	.23586
	10.72	.21001		9.736	.24390
23	.0360	.14575	30	.0235	.14383
	.3355	.14934		.0296	.13980
	1.230	.16334		.0832	.16328
	1.817	.17154		.4310	.21209
	3.723	.18677		1.8519	.19384
	7.935	.20356		3.2337	.22784
	10.55	.21231		9.639	.23813
24	.0342	.14428	35	.01384	.15522
	.2732	.14582		.1143	.17455
	1.083	.17056		.5694	.16182
	2.253	.18582		2.786	.19514
	4.914	.20175		4.541	.20829
	10.39	.21450		9.292	.23991
25	.0325	.14152	40	.01166	.14301
	.2138	.14296		.04054	.16851
	.7984	.17115		.2173	.16751
	1.4513	.18611		1.139	.19073
	2.4864	.22263		1.621	.20210
	10.23	.21717		9.068	.24677
26	.0307	.14252	45	.009491	.13902
	.1545	.14133		.01789	.15532
	.5711	.16903		.1219	.16042
	2.000	.22055		.2677	.19145
	5.761	.20745		.7535	.20220
	10.10	.22526		5.023	.23418
				9.000	.24542

Table VII continued

$\Delta S/R$	ρ/ρ_o	$\gamma-1$	$\Delta S/R$	ρ/ρ_o	$\gamma-1$
50	.007318	.13879	75	.002667	.16169
	.009239	.14314		.006446	.16572
	.05064	.16547		.04105	.18308
	.1216	.18571		.1023	.20377
	.2896	.19882		.4579	.20794
	.6661	.22796		3.707	.22005
	2.393	.21866		9.118	.24490
	9.000	.24793			
			80	.002384	.15669
55	.006112	.14085		.003642	.16008
	.02423	.15823		.02271	.17703
	.05696	.17921		.06142	.20111
	.09942	.19867		.3505	.20756
	.34612	.21565		2.149	.21573
	.6998	.21726		7.282	.24571
	5.730	.24439		8.974	.25006
	9.054	.24361			
			85	.002105	.15383
60	.005043	.14508		.002320	.15349
	.01080	.15428		.01441	.17212
	.02124	.17760		.03767	.19855
	.04709	.19059		.2236	.20659
	.1647	.20867		1.640	.20650
	.5143	.21118		4.884	.24060
	3.259	.23552		8.730	.25781
	9.132	.24741			
			90	.001878	.15328
65	.003975	.15058		.008558	.16811
	.004316	.15176		.01904	.19603
	.008044	.17383		.0621	.20249
	.01977	.18402		1.130	.20034
	.1040	.19877		3.335	.24467
	.3123	.20696		8.489	.26697
	1.784	.22352			
	9.195	.24136			
			95	.001678	.15428
70	.003030	.16633		.004772	.16486
	.003243	.16890		.01296	.19381
	.01030	.17568		.07389	.19376
	.06202	.19037		.7440	.20578
	.1385	.20660		2.315	.23800
	.9689	.21445		5.437	.26589
	5.266	.23146		8.296	.27342
	9.157	.24245			

Table VII continued.

$\Delta S/R$	ρ / ρ_0	γ-1	$\Delta S/R$	ρ / ρ_0	γ-1
100	.001479	.15624	125	.000881	.16840
	.002549	.16211		.000968	.17118
	.006988	.19141		.009964	.16295
	.05280	.18497		.07240	.19326
	.3581	.21753		.2732	.21609
	1.651	.23297		.6440	.23741
	3.836	.25911		1.684	.26524
	8.102	.28119		2.966	.30950
				6.184	.37243
105	.00128	.15868		6.412	.36854
	.001384	.15963			
	.004455	.18554	130	.000818	.16757
	.03569	.17827		.00729	.15993
	.2828	.20496		.05127	.18848
	1.308	.22927		.2552	.21170
	2.845	.25380		.4628	.23103
	6.817	.27818		1.249	.26333
	7.854	.29239		1.947	.31137
				4.295	.37115
110	.001167	.16074		6.503	.35884
	.002922	.18154			
	.02720	.17380	135	.000776	.15719
	.2074	.20530		.005514	.15701
	.9654	.22588		.04338	.18816
	1.928	.24909		.1837	.20676
	4.837	.27368		.3608	.23236
	7.544	.30627		.8144	.26758
				1.5463	.31059
115	.001072	.16304		3.0599	.36754
	.002	.17773		6.594	.35344
	.01872	.16979			
	.1505	.20173			
	.7598	.22408			
	1.291	.25977			
	3.385	.28395			
	6.030	.31294			
	7.177	.32699			
120	.000977	.16559			
	.001380	.17420			
	.01264	.16619			
	.09353	.19845			
	.4109	.21953			
	.8252	.25303			
	2.204	.27801			
	4.184	.31071			
	6.761	.35124			

Table VIII

$\Delta S/R$	(d log e (p_S/p_O))/d($\Delta S/R$)	$\Delta S/R$	(d log e (p_S/p_O))/d($\Delta S/R$)
		27	.10656
.1	4.4458	28	.10429
.2	2.3603	29	.10330
.3	1.7583	30	.10065
.4	1.4474		
.5	1.2385	35	.07265
.6	1.0816	40	.06484
.7	1.0021	45	.06027
.8	.9226	50	.05456
.9	.8553	55	.04885
1.0	.8169	60	.04396
		65	.04025
1.5	.6723	70	.03654
2.0	.5843	75	.03437
2.5	.5134	80	.03252
3.0	.4680	85	.03103
3.5	.4347	90	.03044
4.0	.4115	95	.02984
4.5	.3842	100	.02970
		105	.02970
5	.3481	110	.0297
6	.2877	125	.0298
7	.2657	130	.0299
8	.2583	135	.02961
9	.2163	140	.02902
10	.1992	145	.02843
11	.1691	150	.02784
12	.1537		
13	.1474		
14	.1351		
15	.1238		
16	.1210		
17	.1079		
18	.09789		
19	.09037		
20	.09471		
21	.10195		
22	.10750		
23	.11305		
24	.11217		
25	.11028		
26	.10840		

Table 9. Smoothed equation of state.

P_S/P_0	ρ_0/ρ_S	$\Delta s/R$	T_S	γ	1/a	b
1.00000	1.000	0	300.0	1.40000	.06250	.012500
1.00704	.995	0	300.6	1.39996	.06256	.012516
1.01469	.990	.0000005	301.2	1.39993	.06261	.012531
1.02138	.985	.0000006	301.8	1.39989	.06267	.012547
1.02869	.980	.0000012	302.4	1.39986	.06272	.012562
1.03608	.975	.0000052	303.1	1.39982	.06278	.012578
1.04356	.970	.0000086	303.7	1.39979	.06283	.012593
1.05114	.965	.0000127	304.3	1.39975	.06289	.012609
1.05881	.960	.0000179	304.9	1.39972	.06294	.012624
1.06658	.955	.0000288	305.6	1.39968	.06300	.012640
1.07445	.950	.0000386	306.2	1.39965	.06305	.012655
1.08242	.945	.0000501	306.9	1.39961	.06311	.012671
1.09049	.940	.0000680	307.5	1.39958	.06317	.012686
1.09866	.935	.0000841	308.2	1.39954	.06322	.012702
1.10695	.930	.0001066	308.8	1.39950	.06328	.012718
1.11534	.925	.0001320	309.5	1.39947	.06333	.012733
1.12384	.920	.0001631	310.2	1.39943	.06339	.012749
1.13246	.915	.0001966	310.9	1.39940	.06345	.012764
1.14119	.910	.0002358	311.5	1.39936	.06350	.012780
1.15004	.905	.0002779	312.2	1.39933	.06356	.012796
1.15900	.900	.0003275	312.9	1.39929	.06361	.012812
1.16810	.895	.0003812	313.6	1.39926	.06367	.012827
1.17731	.890	.0004435	314.3	1.39922	.06373	.012843
1.18666	.885	.0005111	315.1	1.39919	.06378	.012859
1.19613	.880	.0005867	315.8	1.39915	.06384	.012875
1.20574	.875	.0006692	316.5	1.39912	.06389	.012891
1.21548	.870	.0007593	317.2	1.39908	.06395	.012907
1.22537	.865	.0008569	318.0	1.39904	.06401	.012923
1.23539	.860	.0009631	318.7	1.39901	.06406	.012939
1.24556	.855	.0010792	319.5	1.39897	.06412	.012955
1.25588	.850	.0012057	320.2	1.39894	.06417	.012971
1.26635	.845	.0013432	321.0	1.39890	.06423	.012987
1.27697	.840	.0014905	321.8	1.39887	.06429	.013003
1.28776	.835	.0016500	322.6	1.39883	.06434	.013019
1.29870	.830	.0018216	323.4	1.39880	.06440	.013036
1.30981	.825	.0020054	324.2	1.39876	.06446	.013052
1.32109	.820	.0022025	325.0	1.39873	.06451	.013068
1.33254	.815	.0024135	325.8	1.39869	.06457	.013085
1.34417	.810	.0026396	326.6	1.39865	.06463	.013102
1.35598	.805	.0028801	327.5	1.39862	.06468	.013118
1.36798	.800	.0031363	328.3	1.39858	.06474	.013135
1.38017	.795	.0035907	329.2	1.39855	.06480	.013152

Table 9. (Continued).

P_S/P_O	ρ_O/ρ_S	$\Delta s/R$	T_S	γ	1/a	b
1.392549	.790	.0037013	330.0	1.39851	.06485	.013169
1.405130	.785	.0040108	330.9	1.39848	.06491	.013186
1.417915	.780	.0043146	331.8	1.39844	.06497	.013203
1.430910	.775	.0046872	332.7	1.39841	.06502	.013220
1.444119	770	.0050563	333.6	1.39837	.06508	.013237
1.457548	.765	.0054475	334.5	1.39834	.06514	.013254
1.471205	.760	.0058666	335.4	1.39830	.06519	.013272
1.485088	.755	.0063001	336.4	1.39827	.06525	.013289
1.499210	.750	.0067621	337.3	1.39823	.06531	.013307
1.513575	.745	.0072484	338.3	1.39819	.06537	.013325
1.528190	.740	.0077638	339.3	1.39816	.06542	.013343
1.543061	.735	.0083064	340.2	1.39812	.06548	.013361
1.558195	.730	.0089052	341.2	1.39809	.06554	.013379
1.573598	.725	.0094804	342.3	1.39805	.06559	.013398
1.589278	.720	.0101136	343.3	1.39802	.06565	.013416
1.605244	.715	.01107816	344.3	1.39798	.06571	.013435
1.621502	.710	.0114826	345.4	1.39795	.06577	.013454
1.638061	.705	.0122209	346.4	1.39791	.06582	.013473
1.654928	.700	.0129951	347.5	1.39788	.06588	.013492
1.672114	.695	.0138420	348.6	1.39784	.06594	.013512
1.689626	.690	.0146616	349.8	1.39781	.06600	.013531
1.707474	.685	.0155567	350.9	1.39777	.06605	.013551
1.725669	.680	.0164959	352.0	1.39773	.06611	.013571
1.744220	.675	.0174865	353.2	1.39770	.06617	.013592
1.763137	.670	.0185367	354.4	1.39766	.06623	.013612
1.782432	.665	.0195931	355.6	1.39763	.06628	.013633
1.802117	.660	.0207265	356.8	1.39759	.06634	.013654
1.822203	.655	.0219128	358.1	1.39756	.06640	.013675
1.842702	.650	.0231549	359.3	1.39752	.06646	.013697
1.863627	.645	.0244848	360.6	1.39749	.06651	.013719
1.884994	.640	.0258153	361.9	1.39745	.06657	.013741
1.906813	.635	.0272371	363.2	1.39742	.06663	.013764
1.929101	.630	.0287266	364.6	1.39738	.06669	.013787
1.951874	.625	.0302825	366.0	1.39734	.06675	.013810
1.975146	.620	.0319103	367.4	1.39730	.06680	.013834
1.998934	.615	.0336113	368.8	1.39727	.06686	.013858
2.023256	.610	.0353892	370.3	1.39724	.06692	.013882
2.048130	.605	.0372486	371.7	1.39720	.06698	.013907
2.073576	.600	.0391917	373.2	1.39717	.06704	.013932
2.099611	.595	.0412199	374.8	1.39713	.06709	.013958
2.126259	.590	.0433891	376.3	1.39710	.06715	.013985
2.153540	.585	.0456708	377.9	1.39706	.06721	.014012

Table 9. (Continued).

P_S/P_O	ρ_O/ρ_S	$\Delta S/R$	T_S	γ	1/a	b
2.181478	.580	.0478674	379.6	1.39703	.06727	.014039
2.210096	.575	.0502831	381.2	1.39699	.06733	.014067
2.239420	.570	.0528108	382.9	1.39696	.06739	.014095
2.269476	.565	.0554426	384.7	1.39692	.06744	.014125
2.300292	.560	.0581956	386.4	1.39688	.06750	.014154
2.331897	.555	.0610700	388.3	1.39685	.06756	.014185
2.364321	.550	.0640718	390.1	1.39681	.06762	.014216
2.397598	.545	.0672062	392.0	1.39678	.06768	.014248
2.431761	.540	.0704810	393.9	1.39674	.06773	.014281
2.466845	.535	.0738457	395.9	1.39671	.06780	.014314
2.502890	.530	.0774729	398.0	1.39667	.06786	.014349
2.539934	.525	.0811402	400.0	1.39664	.06791	.014384
2.578021	.520	.0850969	402.2	1.39660	.06797	.014420
2.617909	.515	.0898540	404.5	1.39656	.06803	.014458
2.657494	.510	.0934026	406.6	1.39653	.06809	.014497
2.698979	.505	.0978513	408.9	1.39649	.06816	.014538
2.741698	.500	.1025353	411.2	1.39645	.06822	.014580
2.785708	.495	.1073368	413.7	1.39641	.06829	.014623
2.831067	.490	.1124028	416.2	1.39637	.06835	.014669
2.877839	.485	.1176608	418.7	1.39633	.06842	.014716
2.926090	.480	.1232320	421.4	1.39629	.06849	.014766
2.975892	.475	.1290190	424.1	1.39624	.06856	.014817
3.027320	.470	.1350707	426.9	1.39620	.06863	.014870
3.080454	.465	.1414009	429.7	1.39615	.06871	.014926
3.135380	.460	.1480221	432.7	1.39611	.06879	.014984
3.192190	.455	.1549506	435.7	1.39606	.06887	.015045
3.250984	.450	.1622031	438.9	1.39601	.06896	.015109
3.311865	.445	.1697973	442.1	1.39596	.06904	.015176
3.374948	.440	.1777438	445.5	1.39590	.06913	.015246
3.440355	.435	.1860712	449.0	1.39585	.06922	.015319
3.508211	.430	.1947959	452.6	1.39579	.06932	.015396
3.578655	.425	.2039431	456.3	1.39573	.06942	.015477
3.651833	.420	.2136190	460.1	1.39567	.06953	.015563
3.727903	.415	.2277592	464.4	1.39560	.06964	.015656
3.807035	.410	.2341280	468.3	1.39553	.06977	.015755
3.889405	.405	.2454080	472.6	1.39544	.06991	.015862
3.975215	.400	.2568153	477.0	1.39535	.07006	.015977
4.064681	.395	.2690200	481.7	1.39525	.07024	.016101
4.158038	.390	.2818436	486.5	1.39514	.07042	.016235
4.255542	.385	.2932255	491.5	1.39502	.07063	.016380
4.357409	.380	.3094965	496.7	1.39488	.07087	.016541
4.463938	.375	.3237	502.2	1.39472	.07114	.016720

Table 9. (Continued).

P_S/P_O	ρ_O/ρ_S	$\Delta S/R$	T_S	γ	1/a	b
4.575454	.370	.3391	507.9	1.39454	.07145	.016916
4.692314	.365	.3549	513.8	1.39434	.07179	.017131
4.814908	.360	.3715	520.0	1.39412	.07217	.017366
4.943583	.355	.3890	526.5	1.39387	.07261	.017627
5.078802	.350	.4073	533.3	1.39359	.07309	.017918
5.221069	.345	.4266	540.4	1.39328	.07364	.018234
5.370947	.340	.4469	547.8	1.39294	.07423	.018584
5.529059	.335	.4683	555.7	1.39257	.07489	.018963
5.696101	.330	.4910	563.9	1.39217	.07560	.019384
5.872843	.325	.5150	572.6	1.39174	.07637	.019840
6.060152	.320	.5403	581.8	1.39128	.07720	.020336
6.258999	.315	.5673	591.5	1.39079	.07810	.020876
6.470481	.310	.5960	601.8	1.39027	.07905	.021463
6.695832	.305	.6265	612.7	1.38972	.08007	.022102
6.936290	.300	.6591	624.3	1.38913	.08118	.022803
7.193415	.295	.6940	636.6	1.38850	.08237	.023573
7.468993	.290	.7314	649.8	1.38783	.08365	.024419
7.765072	.285	.7715	663.9	1.38712	.08502	.025345
8.084018	.280	.8147	679.1	1.38637	.08649	.026364
8.428321	.275	.8614	695.3	1.38557	.08808	.027494
8.801106	.270	.9120	712.9	1.38472	.08979	.028745
9.206045	.265	.9656	731.9	1.38382	.09162	.030134
9.647125	.260	1.0225	752.5	1.38286	.09361	.031688
10.129009	.255	1.0841	774.9	1.38183	.09578	.033437
10.657185	.250	1.1498	799.3	1.38072	.09816	.035419
11.238590	.245	1.2222	826.0	1.37953	.10075	.037669
11.880092	.240	1.3021	855.4	1.37823	.10365	.040261
12.589677	.235	1.3848	887.6	1.37679	.10693	.043286
13.377246	.230	1.4754	923.0	1.37519	.11066	.046846
14.253156	.225	1.5736	962.1	1.37339	.11498	.051089
15.229965	.220	1.676	1005.2	1.37136	.11999	.056194
16.323461	.215	1.790	1052.9	1.36908	.12538	.062373
17.550159	.210	1.915	1105.7	1.36652	.13263	.069909
18.935429	.205	2.049	1164.5	1.36366	.14056	.079371
20.505376	.200	2.193	1230.3	1.36050	.14974	.090301
22.292772	.195	2.344	1304.1	1.35700	.16042	.104804
24.335644	.190	2.516	1387.1	1.35316	.17287	.122639
26.681095	.185	2.699	1480.8	1.34893	.18743	.145230
29.384061	.180	2.904	1586.7	1.34430	.20450	.174111
32.511013	.175	3.121	1706.8	1.33924	.22456	.211371
36.139438	.170	3.359	1843.1	1.33373	.24823	.259893
40.358840	.165	3.620	1997.8	1.32774	.27625	.323653
45.268966	.160	3.888	2172.9	1.32126	.30966	.408141
50.975052	.155	4.176	2370.3	1.31427	.34929	.520926
57.57373	.150	4.483	2590.8	1.30675	.39693	.674805
65.131941	.145	4.811	2833.2	1.29868	.45431	.876315
73.646167	.140	5.164	3093.1	1.29007	.52391	1.151158

Table 9. (Continued).

P_S/P_O	ρ_S/ρ_O	$\Delta s/R$	T_S	1/a	b
94.73	7.684	6	3606	.7937	2.3797
124.89	8.374	7	4248	1.2270	5.0657
161.17	9.134	8	4812	1.6667	8.8022
224.49	9.753	9	5451	2.0000	14.3488
250.79	10.258	10	6021	2.3256	18.3394
301.03	10.700	11	6648	2.5641	23.7077
352.63	11.060	12	7050	2.6316	27.5087
410.00	11.395	13	7530	2.5316	29.1810
491.11	11.703	14	8001	2.2727	29.1733
532.50	11.885	15	8475	2.0408	26.7892
602.14	12.033	16	8838	1.7699	24.5515
671.14	12.083	17	9537	1.4925	21.5594
747.86	11.984	18	10254	1.2658	19.3758
820.07	11.777	19	11004	1.0417	16.6271
899.17	11.473	20	12012	.8658	14.6232
993.0	11.068	21	13392	.6944	12.4802
1094.0	10.72	22	14920	.5435	10.1931
1248.6	10.55	23	16486	.4132	8.0798
1408.3	10.39	24	18083	.3384	7.0126
1568.1	10.23	25	19680	.2890	6.3748
1763.0	10.10	26	21253	.2513	5.9750
1966.8	9.974	27	22821	.2247	5.7834
2170.5	9.849	28	24389	.2033	5.6264
2412.2	9.736	29	26081	.1866	5.6207
2678.2	9.629	30	27854	.1736	5.7164
4039.3	9.292	35	36929	.1300	5.9799
5688.0	9.068	40	46600	.1048	6.3829